TRANSACTIONS

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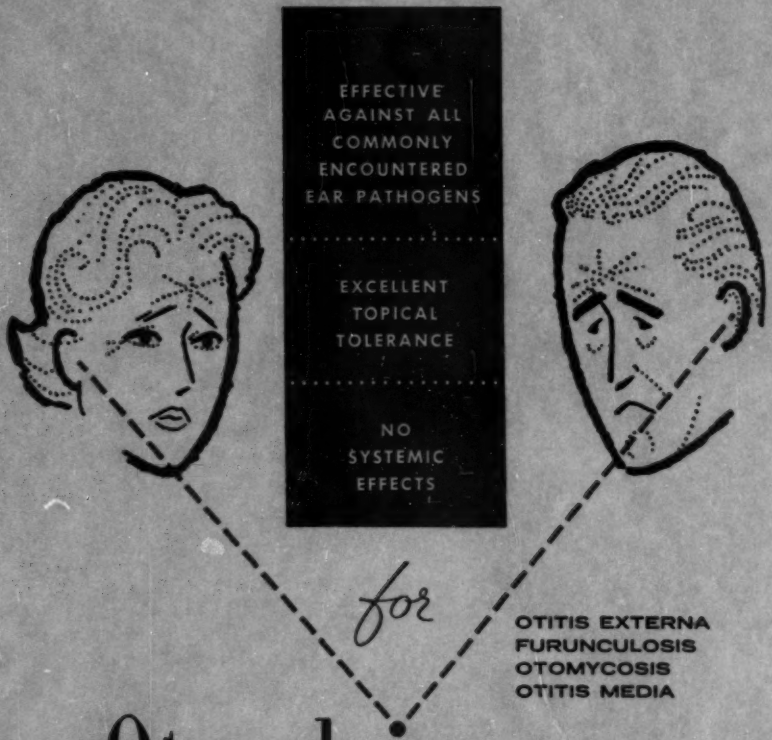

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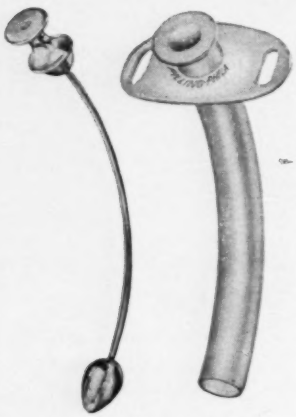

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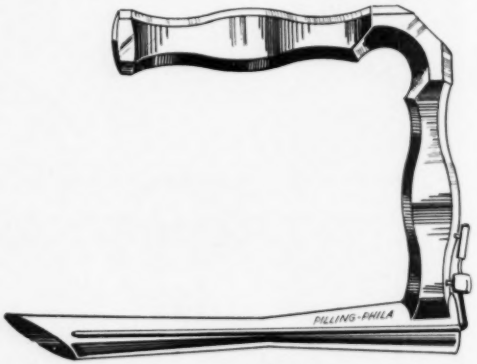

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RADIATION THERAPY IN THE MANAGEMENT OF CANCERS OF THE ORAL CAVITY AND OROPHARYNX by **Gilbert H. Fletcher** and **William S. MacComb,** both of Univ. of Texas. With the collaboration of **Alando J. Ballantyne.** Physics Section by **Robert J. Shalek** and **Marilyn A. Stovall.** This informative manual has evolved from nearly a decade of formal instruction to residents of radiotherapy and to radiological physicists. Covers in detail clinical principles underlying management with special emphasis on clinical varieties, integration of radiation and surgery, patient care, and management of complications. **Pub. April '61 (Amer. Lec. Radiation Therapy)**

CANCER OF THE NASOPHARYNX: Its Natural History and Treatment by **M. Lederman,** Royal Marsden Hospital. Of interest to all concerned in the diagnosis and treatment of malignant diseases of the head and neck. Contents: The Clinical Material; The Anatomy of the Nasopharynx in Relation to the Origin and Spread of Cancer; Mode of Spread of Nasopharyngeal Cancer in Relation to Presenting Symptoms; Pain as a Symptom in Nasopharyngeal Cancer; Radiological Appearances; Histology and Pathology, Treatment Principles; Radiotherapy Techniques; Complications of Radiotherapy and Their Prevention; Results of Treatment. **Pub. Feb. '61 (Amer. Lec. Radiation Therapy)**

OPTICS: An Introduction for Ophthalmologists by Kenneth N. Ogle, Mayo Clinic. A concise exposition of the basic facts of geometric optics specifically as applied to modern ophthalmic optics. Dr. Ogle is eminently qualified to write such a text. He is well known for his outstanding research contributions in optics and visual physiology. The material is presented in such a way as to meet directly the needs of the student ophthalmologist in his preparation for study of the refraction of the eye and as a background for his understanding of physiologic optics and visual physiology. **Pub. Jan. '61**

NEURAL MECHANISMS OF THE AUDITORY AND VESTIBULAR SYSTEMS, edited by **Grant L. Rasmussen** and **William F. Windle,** both of the National Institute of Neurological Diseases and Blindness, Bethesda, Maryland. This conference represents the tenth in a series of such meetings called by the National Institute and designed to provide stimulus and encouragement in an important field of research. Publication of the proceedings provides a unique and stimulating exchange of knowledge between thirty-two scientists throughout the world who have a common interest in the ear and its mechanisms. **Pub. Feb. '61, 238 pp., 179 il., $8.75**

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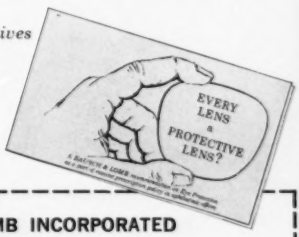

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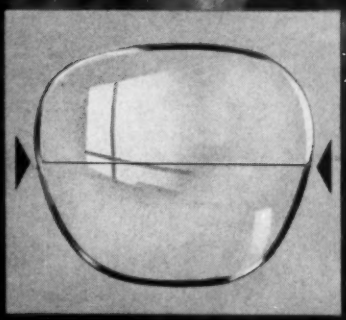

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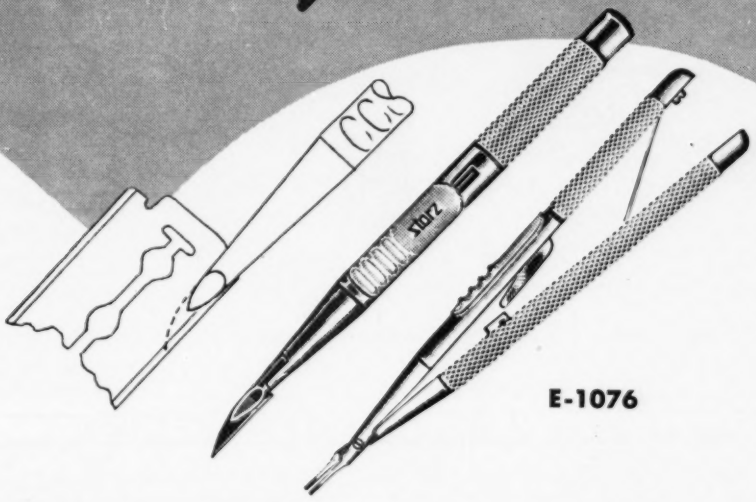

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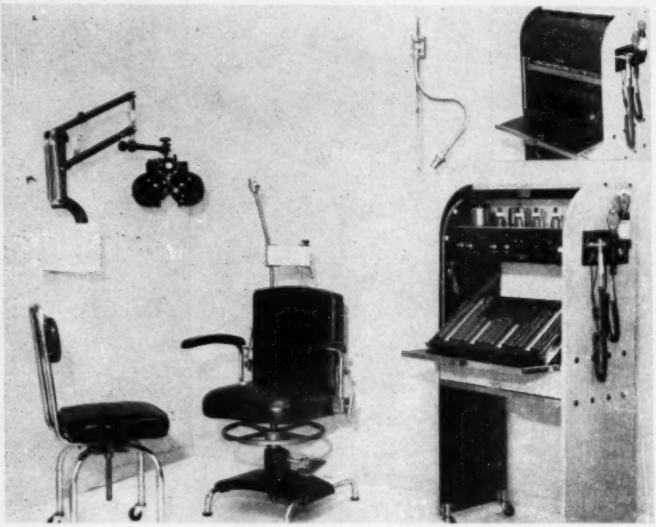

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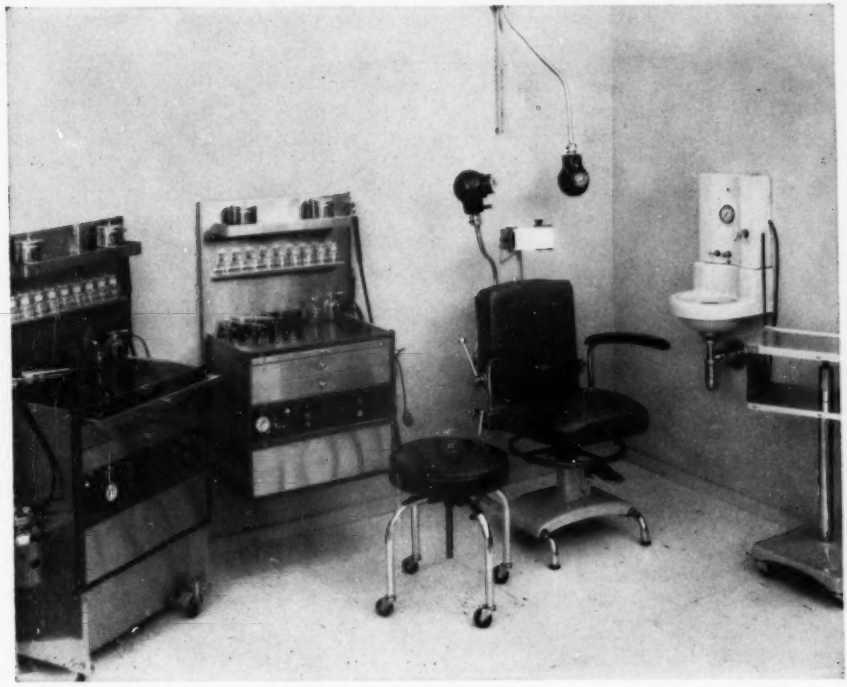

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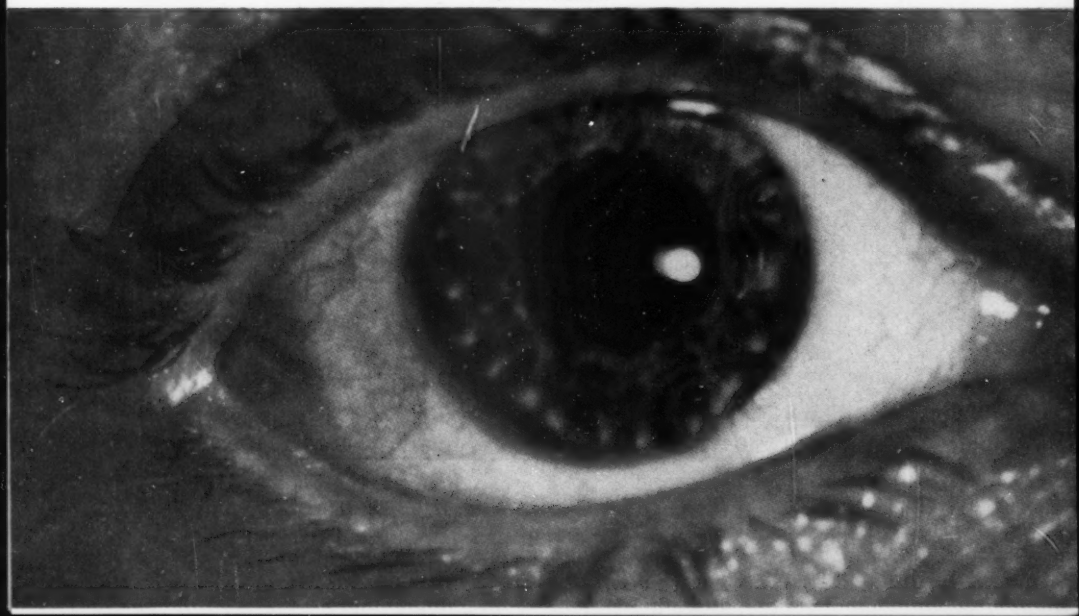

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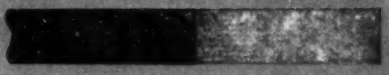

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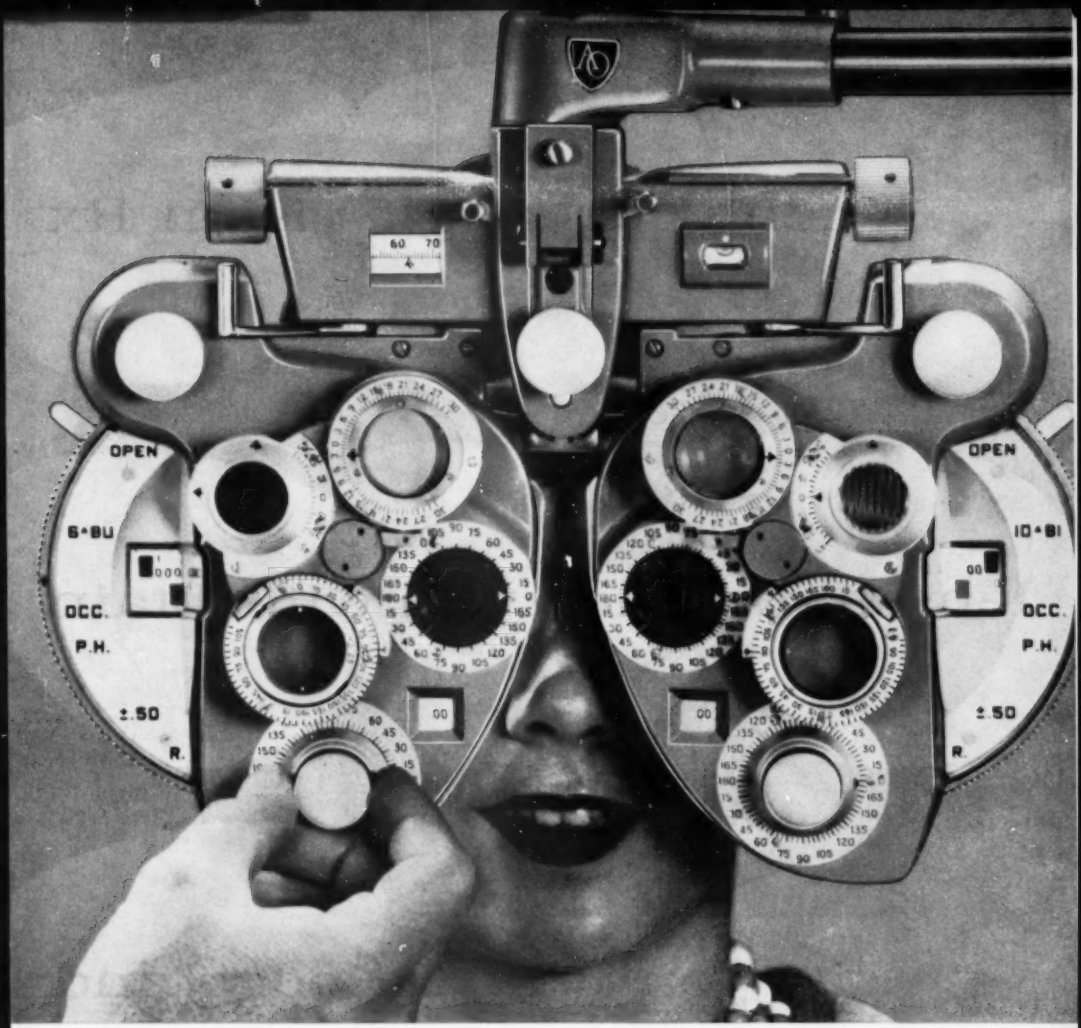

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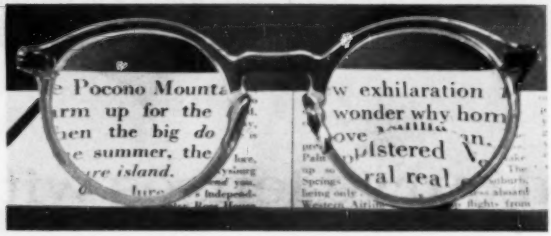

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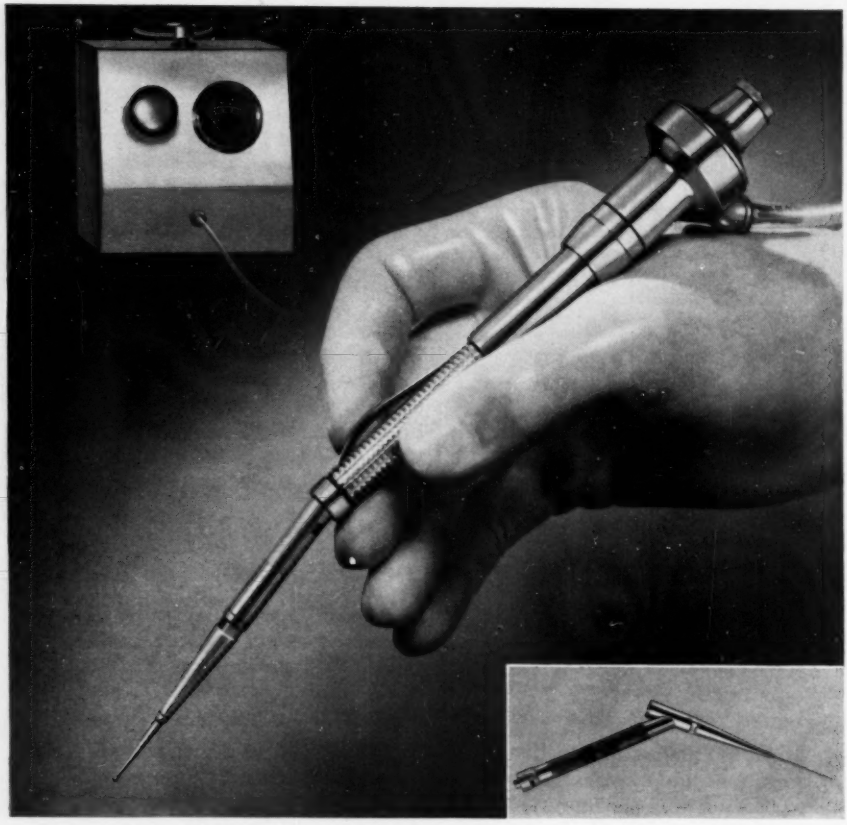

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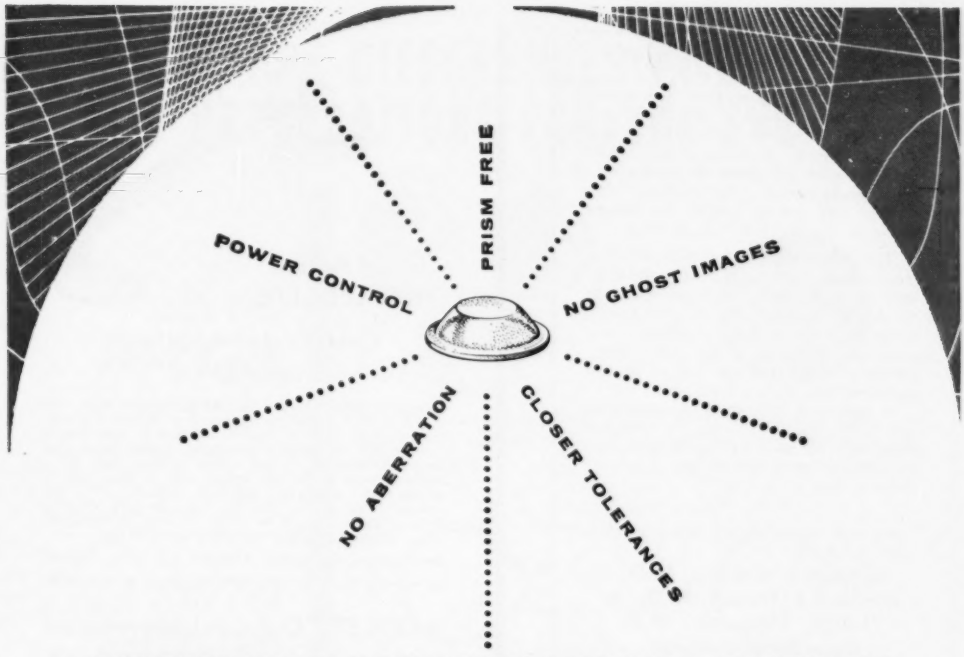

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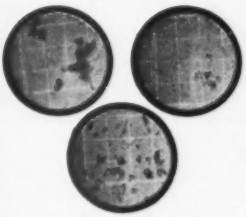

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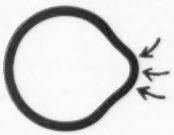

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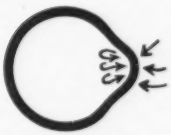

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Address of the President

OUR SPECIALTY BOARDS

DEAN M. LIERLE, M.D.
IOWA CITY, IOWA

I WOULD like to thank you for the very great honor you have conferred upon me by naming me your President.

The American Academy of Ophthalmology and Otolaryngology is, in my opinion, one of the finest organizations of its kind in the world. It has always been interested in the young physician. As an educational institution, it performs many services such as preparing and distributing pamphlets, manuals and motion picture films. In addition, it sponsors instructional courses, scientific programs and the Home Study Courses. The work of its many Council-appointed committees is well known, and it has always stimulated research in the fields of Ophthalmology and Otolaryngology.

The purpose of this paper is to give you some general information regarding the American Specialty Boards and some of their affiliated organizations. The opinions expressed here are my own and do not reflect those of any Board or its individual members.

I would like to review the founding of the ophthalmological and otolaryngological Boards and to give their original objectives as well as their objectives today. According to the Directory of Medical Specialists, in 1913 the American Ophthalmological Society, the Section on Ophthalmology of the American Medical Association, and the American Academy of Ophthalmology and Otolaryngology appointed a committee to report on the status of ophthalmic education in this country. In 1914, this committee recommended that postgraduate courses two years in length be given in ophthalmology. This suggestion was approved, and as a result in 1915, a joint Board representing each of the three societies was formed. Thus, the first Specialty Board was established and was known as the American Board of Ophthalmology. This Board was incorporated in 1917. In 1934, the plan of organization expanded to include four rather than three representatives from each society. According to the minutes of the Academy, published in the TRANSACTIONS of 1922, 342 persons had been certified by that time.

The American Board of Otolaryngology was organized in the following manner. A small committee appointed by the Academy to give examinations in otolaryngology met for the first time in 1916. In 1924 this committee was enlarged to include two representatives from each of the following national societies: the American Academy of Ophthalmology and Otolaryngology; the Section on Otolaryngology of the American Medical Association; the American Otological Society; the American Laryngological Association, and the American Laryngological, Rhinological and

Presented at the *Joint Session* of the Sixty-Fifth Annual Session of the American Academy of Ophthalmology and Otolaryngology, Oct. 9-14, 1960, Chicago.

Otological Society. This group of ten, with the support of the above societies, became the American Board of Otolaryngology. In 1947 it was incorporated and its membership was increased to twenty-five. The five societies still select ten of the members, while the other fifteen are chosen at large.

As far as I can determine, the objective of the two original committees was to provide a standard for membership in the special societies. Time will not permit a detailed account of the specific objectives of each of the other Boards, but generally speaking, these objectives are much the same as those stated by our own Boards. These objectives are:

1. To elevate the standards of the specialties.
2. To determine the competence of the individuals seeking certification on a voluntary basis.
3. To conduct examinations for candidates who appear before the Boards, and issue certificates to those who pass.
4. To act as advisers of prospective students.
5. To encourage opportunities for improved teaching and training.

It is quite evident that very few people, other than Board members themselves, know little about the Advisory Board for Medical Specialties. Therefore, I wish to quote from the Directory of Medical Specialists, the ninth edition, in regard to its origin, function, and other general information which may be of interest to you.

The Advisory Board was organized in 1933-34, to coordinate graduate education and certification of medical specialties in the United States and Canada. . . .

. . . It was clearly essential that an examining Board must have the official sanction of the National societies in its given specialty as well as that of its section of the American Medical Association. . . .

. . . At the Milwaukee session of the American Medical Association in 1933, a resolution was adopted authorizing the Council on Medical Education and Hospitals: (1) to formulate standards of administration based in general on those of the American Boards of Ophthalmology, of Otolaryngology, of Obstetrics and Gynecology, and of Dermatology and Syphilology and, (2) to recognize officially new Boards meeting these standards, this recognition to be based upon previous approval and recommendation to the Council by the Advisory Board. . . .

To quote further from the same source, the purpose of the Advisory Board is as follows:

"This Board shall act in an advisory capacity to such organizations as may seek its advice concerning the coordination of the education and certification of medical specialists." Specifically, this represents an official effort to advance the standards and improve the methods of graduate education and training in the medical specialties, with certification of men thus educated and trained who qualify as specialists in the various branches. The common interest of the member organizations in these purposes is obvious. It is equally apparent that some fixed definition of specialties needed to be established, preferably on a graduate educational basis, that minimum standards of organization and conduct for new examining Boards should be fixed and that some official method of recognition be developed.

The Constitution and Bylaws of the Advisory Board specifically state:

There is no desire on the part of these Boards to interfere with any practitioners of medicine in any of their regular or legitimate activities. Their fundamental purpose is to ensure to the public both lay and medical, and for its protection, that physicians claiming to be specialists with presumably special proficiency in one or another branch of medicine, actually possess the qualifications they claim. . . . Suitable evidence of this is the ability of an individual to satisfy an examining Board about his training and then to pass the examination for certification.

The Advisory Board is composed of two representatives from each of the existing specialties and representatives from the National Board of Medical Examiners, the Federation of State Medical Boards of the United States of America, the American Hospital Association, the Council on Medical Education and Hospitals of the American Medical Association, and the American Association of Medical Colleges. Examining Board representatives usually include the President and the Secretary, but this need not be the case, for even a non-Board member can be appointed. Nineteen different Specialty Boards are represented.

The Advisory Board of Medical Specialists usually meets annually. Although it truly is an "advisory" Board, and does not interfere with the internal affairs of individual Boards, it has certain powers. For example, any newly proposed American Board must be approved before it can become a reality. The Advisory Board can censure an individual Board. Furthermore, it definitely outlines qualifications for all those with special training seeking general professional qualifications. It sets forth rules for the organization of examining Boards and serves as a forum for the representatives of the member organizations to meet and discuss problems of mutual interest. Its officers include a president, vice-president, secretary and treasurer.

The Specialty Examining Boards have another function in addition to that of evaluating the candidates. They assist in approving residency training in the various institutions throughout the country. In other words, certain standards must be met before an institution is accepted for specialty training. Consequently, in order to carry out the above functions, all Boards except Pathology have residency review committees. The chief function of a residency review committee is to approve the residency training of the specialties in teaching institutions applying for such approval. No institution need request approval unless it desires to do so. The approval of residency training in a specialty is dependent upon a number of factors, such as an adequate staff, a good teaching program, a good basic science program, sufficient clinical material, library facilities, and compliance with clinical and surgical experience covering the broad field of the specialty.

There are two types of review committees. One consists of representatives of the Specialty Boards and the Council on Medical Education and Hospitals of the American Medical Association. The second type might be called a tri-part residency review committee, consisting of representatives of a specific Board, of the Council on Medical Education and Hospitals, and of another society. Otolaryngology, Gynecology and Obstetrics, General Surgery, and Plastic Surgery have additional members who are representatives from the American College of Surgeons. Another committee consists of representatives from the Board of Internal Medicine, from the American College of Physicians, and from the American Medical Association. The Review Committee of Pediatrics also has a tri-part committee having representatives from its Board, from the American Academy of Pediatrics, and from the American Medical Association. All of the aforementioned representatives are from the specialties involved and all are physicians. For example, the representatives of the Review Committee in Otolaryngology are all otolaryngologists. The secretary is furnished by the Council on Medical Education and Hospitals of the American Medical Association.

Many Boards, twelve in number, are working with the Educational Council for Foreign Medical Graduates (hereinafter referred to as ECFMG), providing a screening method for those foreign physicians who wish to take Board examinations. The ECFMG was organized October 1, 1957. The sponsoring agencies are the American Medical Association, the American Hospital Association, the Association of American Medical Colleges, and the Federation of State Medical Boards. The ECFMG seeks to provide information regarding medical graduates of foreign countries who are applying for internships and residencies in the United States medical institutions and hospitals and to establish qualifications for foreign medical graduates while in a foreign country. ECFMG gives qualifying examinations which are, as I understand it, Board-type questions such as have been given to our students and graduates. ECFMG also examines in regard to the English language proficiency of foreign medical graduates. This organization should be extremely helpful because there is presently no other available method of accrediting or standardizing foreign medical schools. In other words, we know little as to whether or not they approximate our own standards.

The specialty Boards were created to help correct a pre-existing inequality on the examination of a specialist's proficiency. The examinations are on a voluntary basis, and a specialist need not take the examination in order to practice his specialty. Some will say this is not true and that examinations are practically mandatory if one wishes to join a clinic, hospital staff or special society. This is not necessarily the fault of the Specialty Boards. The responsibility here rests with the institutions and the societies requiring certification, for evidently they feel that the certified man is a better product. Some institutions do not require certification for teachers but do insist upon equivalent training. Some special societies, in order to keep their autonomy, reserve the right to admit to their membership individuals who are not certified.

Dr. John Nunemaker, secretary for the Council on Medical Education and Hospitals of the American Medical Association, has made a summary of American Specialty Board requirements. You may be interested in some of them. There are nineteen examining Boards. Nine require that a candidate have United States citizenship to be eligible to take the examinations; ten do not. All require graduation from an approved medical school. Fifteen require licensure to practice as a prerequisite for examination; eighteen require an approved internship. The period of residency training is from two to five years. The minimum requirement for Ophthalmology is three years, and four years for Otolaryngology.

The years of practice required before a candidate is permitted to take the Board examinations vary. Two Boards require no practice. The majority require from one to three years. Ophthalmology requires one year, and after 1963, the American Board of Otolaryngology will not require a period of practice. All but three Boards give credit for work in related fields. Ophthalmology and Otolaryngology do not. Ten of the Boards give some credit for military service. The Board of Ophthalmology does, and the Board of Otolaryngology does not. Six of the nineteen Boards permit alternate plans of training. Ophthalmology does; Otolaryngology does not. Only four require membership in a national medical society. Both of our specialties do. All Boards accept foreign medical graduates for examination un-

der certain conditions. Thirteen boards, including Ophthalmology and Otolaryngology, accept screening by the National Board of Medical Examiners, ECFMG, or other methods. Special certificates are granted by eight. The total fees for examination range from $100 to $175.

All Boards now elect their members for a definite term of office. This has not always been true. In some Boards the term is four to five years, with one or two reappointments permitted. In one Board the examiner has a nine-year term with no reappointment possible. This prevents the existence of a self-perpetuating group, or groups, and eliminates the danger of political cliques. The method of electing new members is as democratic as possible. Normally two or three names are sent to the societies represented on a Board for consideration for replacement. If they approve of none of the men whose names are submitted, they may reject them and ask for new names. Societies rarely reject, and they accept the nominations proposed by the Board's examiners. I believe that, generally speaking, this system of choosing new Board members is necessary, as it is less political. Everyone realizes in this day and age that every organization has a degree of political feeling, but certainly it should not exist as a political attitude in an examining Board.

The Boards are independent to only a limited degree. They must conform to the rules of the Advisory Board. They are constantly working cooperatively with educational institutions, hospitals and medical societies. Boards are also responsible, in my opinion, to their diplomates, in upholding the highest standards for qualification. The type and method of examination must, of course, be left to the discretion of each Board.

COMMENT

I certainly agree that no Board, and particularly not our own, is perfect. They are all likely to make some mistakes, and they cannot hope to please everyone. I believe, however, that they have been of great value in elevating and maintaining standards of the specialties in educational institutions. The influence of Board examinations in improving teaching efforts and facilities in medical schools is one of the outstanding achievements in medical history. The very fact that clinics, hospitals, medical schools, and other organizations express a desire to appoint Board-certified men, or those with equivalent training, is definite evidence that a Board certificate is held in the highest esteem. Boards are in close cooperation with various national medical societies and educational institutions of this country.

Constructive criticism is of great value in any field of endeavor. Diplomates, or anyone else for that matter, should have the right to criticize. I would suggest that any diplomate who has a legitimate objection, or wishes to receive information regarding the activities of his Board, write directly to the secretary of that Board. I would also suggest that diplomates take more active interest in the business meetings of those societies which have representatives on the Boards. They could obtain information in such meetings and could voice their objections or suggestions at that time. I feel strongly that the Boards themselves could do a better public relations job in disseminating information regarding their activities. I also believe there should be a closer relationship between the Boards and the societies which they represent.

In conclusion, I am sure that what I am about to say should be said by a non-

Board member. However, perhaps you will forgive my enthusiasm on the basis that I am a Secretary and not an Examiner; therefore, I have a general panorama of the scene. Generally speaking, Board examiners with whom I have been associated are dedicated individuals. They give their time without recompense. In many instances, they do not receive actual living expenses. They spend considerable time away from their teaching assignments and practice to examine candidates and carry out tedious committee assignments. All of us are interested in improving the standards so that the public may have the best medical care possible. The members of the Boards, I know, appreciate your understanding and your continued support.

Address of the Guest of Honor

THE PURSUIT OF EXCELLENCE

GORDON D. HOOPLE, M.D.
SYRACUSE, NEW YORK

IT is difficult to find a way to express adequately to all of you and to Dr. Lierle, my appreciation for this honor. In simple words, yet as sincerely as I can say them, I am most grateful. A once-in-a-lifetime experience such as this leaves one a bit breathless. If this ever happens to you, and some day it will to a few of you younger men, you won't believe it (!), just as I am unable to believe it now. I wonder why I am here.

I recognize that I am not an outstanding surgeon. While I have created a new interest in a few somewhat forgotten clinical entities, I have contributed but little to the advancement of new knowledge in otolaryngology. I am a fair teacher and I am a reasonably good clinician. But these are not the qualifications for the Guest of Honor of the Academy. If I am to be at all deserving of this honor, I like to think that it is because I have spent considerable time during my career trying to elevate the status of Otolaryngology. I have been fortunate in my later years, both by position and by timing, to have furthered this cause more than otherwise would have been possible.

At this point, I would like to give you an example of my personal philosophy. I have tried to improve the organizations to which I belong, if this has been at all possible. I have done this because I have never enjoyed belonging to anything that is second best. This is why I have chosen this morning to say a few words about the pursuit of excellence.

In these days when medicine is under attack from many sides, it behooves doctors as a group and doctors as individuals to look at medicine and at themselves with a critical eye. Any truth-seeking doctor will admit that there are holes in our armor. While the gaps are not many, for surely our armor is not riddled, there are a few vulnerable spots. One of these is incompetence.

Medical incompetence comes mainly from two sources; inadequate preparation and failure to keep abreast of the fast pace of advancing medical knowledge. Among the young men of the Academy, the problem of inadequate training is less acute now than it was a few years ago. There will be even less of this problem in the future. On the other hand, the difficulty of keeping up is constantly present. It is a problem as individualistic as anything can be, for what kind of a person one is determines to a large degree how much effort he will expend in keeping abreast of medical times.

We must recognize that it is necessary to engage in the war against incompetence as long as we live. There are those

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who sometime during their careers stop trying to keep up. In my opinion, giving up the ghost is largely a matter of lack of motivation. It might be argued that a doctor does not need to keep abreast of the latest advances if office schedules are full, operations are plentiful and collections are ample. But the pace of medical progress is swift, and it would not be long before such a doctor would fall behind. In a short while he would be less busy and in the end he would be a "has been." Medicine is a jealous goddess and she bestows her choicest favors only on those who match her pace.

I would like to suggest, for each of us, the motivating power of the pursuit of excellence. There is nothing of which I know that can be more challenging. When one has chosen such a course, goals are set and there is the business of attaining them. It is distinctly a personal pursuit. Thus it has an intimate character. What are proper goals for one are not necessarily the right goals for another. But the choice of proper goals for ourselves brings with it an incentive that has no equal. It brooks no shoddiness, no indifference, no carelessness. In no field is this as true as in Medicine. It is the best reminder there can be to keep abreast of changes. The doctor who follows this path is sure to be numbered among the best.

A pursuit of excellence is particularly appropriate for members of this Academy for, by its very nature and by what it tries to do, the Academy is engaged in such a pursuit. The plans for the general programs of the Academy, the scientific exhibits and the instructional hours are all aimed in this direction. The Academy has been blessed for nearly forty years by the presence of two executive secretaries, Dr. William Wherry and Dr. William Benedict, who have worked tirelessly for Academy excellence. They have been supported by officers and instructors whose motivation has been similarly geared. The growth of the Academy and the annual attendance are concrete evidence that such a program has an appeal and reaps rich rewards.

There is a very important reason why the Academy and its members should be interested in this pursuit of excellence. Whether we realize it or not, we hold a significant and important place in the field of medicine. We are the custodians of the organs of human communication, the eyes, the ears and the larynx. As such, we have a tremendous responsibility to do our very best.

"Communication is not a luxury in our lives, it is the basis of our humanity."[1] Without communication, man is handicapped indeed. It may be argued that a man can communicate if he does not have his sight, or that he can get along if he loses his hearing or his voice. True, he can, but he is then much less than his best. Once in a generation there is a Helen Keller (who puts some others to shame) but even she, handicapped as she is, has always had her voice. Fortunately, many people pass through life without any impairment of these functions. Many have only temporary maladies of these organs, but each of us has witnessed many examples where temporary maladies improperly cared for have passed over to irrepairable disorders carrying with them permanent handicaps. And these handicaps create, among other things, changes in personality, loss of efficiency and often untold hardship.

The need to communicate with one's fellows is one of the great hungers of the human heart. On this account we Academy members have a great responsibility in our custodianship of the organs of communication. This is both a collective and an individual responsibil-

ity. To carry this responsibility we must be interested in the pursuit of excellence. Because communications involve both our specialties, we should work together on the problem. This is a strong argument why there should be an Academy of Ophthalmology *and* Otolaryngology. There should be one great organization that is interested in this combined custodianship. The responsibility for this interest can be divided according to the organs involved, but somewhere (and where better than the Academy) there should be an over-all approach to the medical problems connected with human communications. This is big and it is challenging. We could well re-evaluate our aims and our position in Medicine in the light of this challenge.

Briefly may I point out that there are four areas where the pursuit of excellence is needed. First, there is prevention. Each of us should be concerned with this, but there are some who should make this their sole concern. This includes those whose activities will center about safety measures, or the correction of conditions which may be responsible for the loss of function of any of the organs in which we are interested. Second, there is treatment. Each of us should be concerned with this, but there are those whose skills should be perfected so they can treat effectively, either medically or surgically, any disorders that may come to them. Third is rehabilitation. And each of us should be concerned with this, but there are those who should devote themselves to the perfection of the arts which can best be used to rehabilitate those patients who have irreversible handicaps. Fourth and last, there is research, and each of us must, of course, be concerned with this. But there should be those who will give their lives through research in the quest for perfection in each of the three previous areas. There are some among us who have already achieved excellence in these four divisions, and they are a challenge to the rest of us.

One final word. The pursuit of excellence is a receding goal. Once excellence is reached in one area, a challenge arises in another. After diligent application we may attain the level of competence of someone whom we once envied, only to find there are remaining heights to be climbed. The pursuit of excellence, as well as the war against incompetence, is a lifetime experience.

Why am I saying these things to you who are here? This message should go to those in our ranks who are not in attendance this morning. They need it more than you do. But it is good for everyone, once in a while, to climb to a personal mountaintop to get a new and inspiring view. With new horizons envisaged we can return with new hopes, new goals and renewed dedication. Particularly is this valuable for us as Academy members. I have pointed out our unique position in Medicine as custodians of the organs of communication. What we need most of all is to become aware of our importance as custodians of the eyes, the ears and the larynx. Then we will have reason indeed for the pursuit of excellence!

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PREVENTION OF INFECTIONS IN THE OPERATING PAVILION

RALPH ADAMS, M.D.
BURKE FAHLMAN, M.S.
WOLFEBORO, NEW HAMPSHIRE

BY INVITATION

THE purpose of this communication is to describe methods by which any critical care area can be rendered nearly sterile in respect to exposed surfaces, and surgically clean in respect to personnel and to air in the area. The term *critical care area* is used to include isolation rooms either for restriction of infection spread from an infectious patient or for prevention of contamination to an area housing a patient who must be carefully protected against infection from outside sources. It includes also the nurseries for premature and newborn babies and the operating pavilion.

As illustrated in figures 1 and 2, the floor and wall surfaces of an isolation room or of a nursery, along with its furniture and equipment, can be converted to a condition of near sterility by the simple process of thorough mechanical cleansing with a detergent solution and application of a germicide.

The operating pavilion has been chosen for a detailed exposition on how to make an area clean and how to keep it clean. We have had three major infections of clean wounds in twelve hundred consecutive cases (0.25 per cent). We assume that our readers believe that maximum approach to utter cleanliness and environmental sterility is desirable in an operating pavilion, and we are making no effort to convince those who believe otherwise. The methodology is simple but rigid. It is economical and effective as now developed and used, as proved by more than 1000 consecutive days of study, usage and improvement.

The condition of an apparently clean floor in a corridor outside the entry doors to an operating pavilion at Huggins Hospital is illustrated in the top Petri dish in figure 3. The two bottom dishes show the condition of bacteriologic cleanliness just inside the entry doors from the outer corridor five minutes and one hour after proper cleaning. This is the interchange zone. There were no restrictions on active usage of the area following a good scrubbing with detergent-germicide solution and wet vacuum cyclonic filter-protected pickup of the slurry.

We have developed a simple method of taking cultures from surfaces which is more satisfactory and better than tra-

Dr. Adams is Professor of Clinical Surgery, Boston University School of Medicine; Chief Division of Surgery, Huggins Hospital, Wolfeboro, and Mr. Fahlman is Bacteriologist, Huggins Hospital, Wolfeboro.

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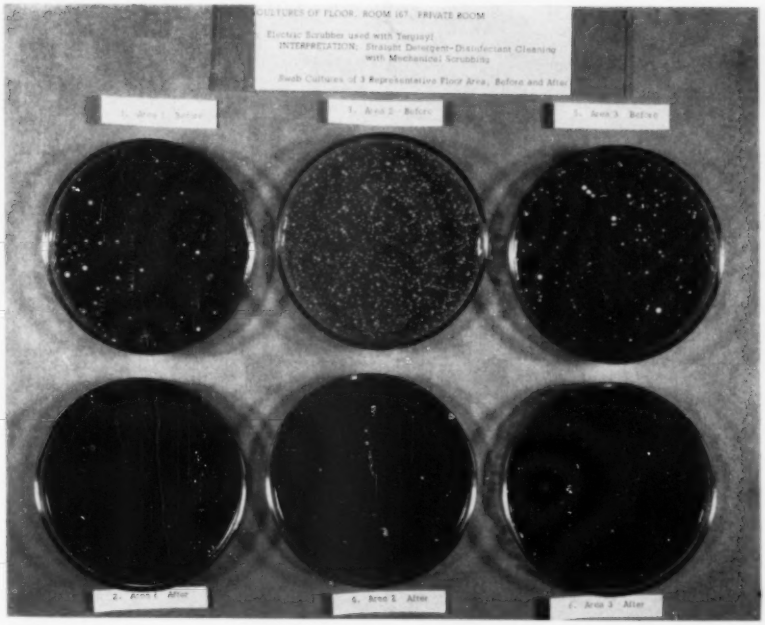
CULTURES OF FLOOR, ROOM 167, PRIVATE ROOM
Electric Scrubber used with Tergisyl
INTERPRETATION: Straight Detergent-Disinfectant Cleaning with Mechanical Scrubbing
Swab Cultures of 3 Representative Floor Area, Before and After
1. Area 1 Before
3. Area 2 Before
5. Area 3 Before
2. Area 1 After
6. Area 2 After
4. Area 3 After

FIGURE 1.

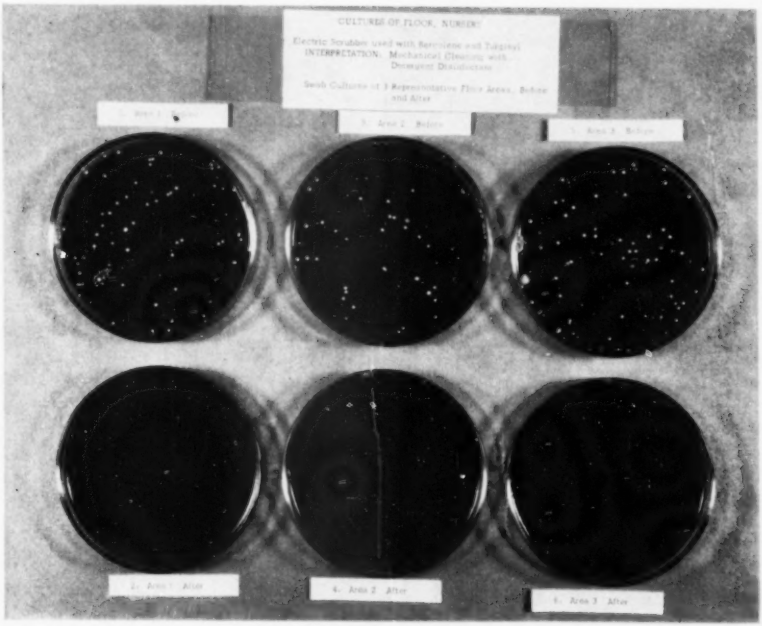
CULTURES OF FLOOR, NURSERY
Electric Scrubber used with Barrisept and Tergisyl
INTERPRETATION: Mechanical Cleaning with Detergent Disinfectant
Swab Cultures of 3 Representative Floor Areas, Before and After
3. Area 2 Before
2. Area 1 After
4. Area 2 After
6. Area 3 After

FIGURE 2.

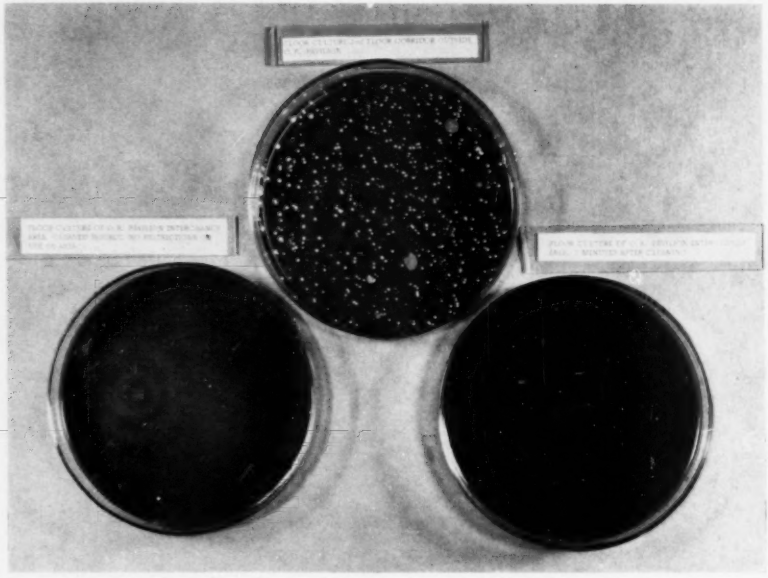

FIGURE 3.

ditional swab culturing. The results are automatically expressed in terms of an area of 10 square centimeters. A Petri dish with an area of 10 square centimeters is fitted with a polyurethane disc that has been coated with blood agar and sterilized (fig. 4). For culture sampling, the disc is merely pressed against the surface to be cultured, re-covered with the Petri lid, and incubated.

Figure 5 is a statement of the law of gravity as applicable to particles, droplets, and droplet nuclei floating in the air. Particles fall almost like tiny pellets; droplets fall like feathers, and droplet nuclei scarcely fall at all. Gravity fallout plates are reflective but not indicative of air contamination by these media. Figure 6 demonstrates this fact. The two plates on the right show gravity fallout accumulation on a surface area of 10 square centimeters (1/15 foot) in one hour, as determined in a nurses' room and in an inadequately protected operating room. The two plates on the left represent the actual contamination in 60 cubic feet of air, being determined by the drawing of one cubic foot of air per minute over the plates for one hour, through a slit sampler.

Another, but more troublesome and less conclusive, method of determining contamination in environmental air is the sieve sampler. Figure 7 shows the unit with the suction outlet, through which one cubic foot of air per minute is drawn. The plates must be changed at 5-minute intervals. Figure 8 shows the

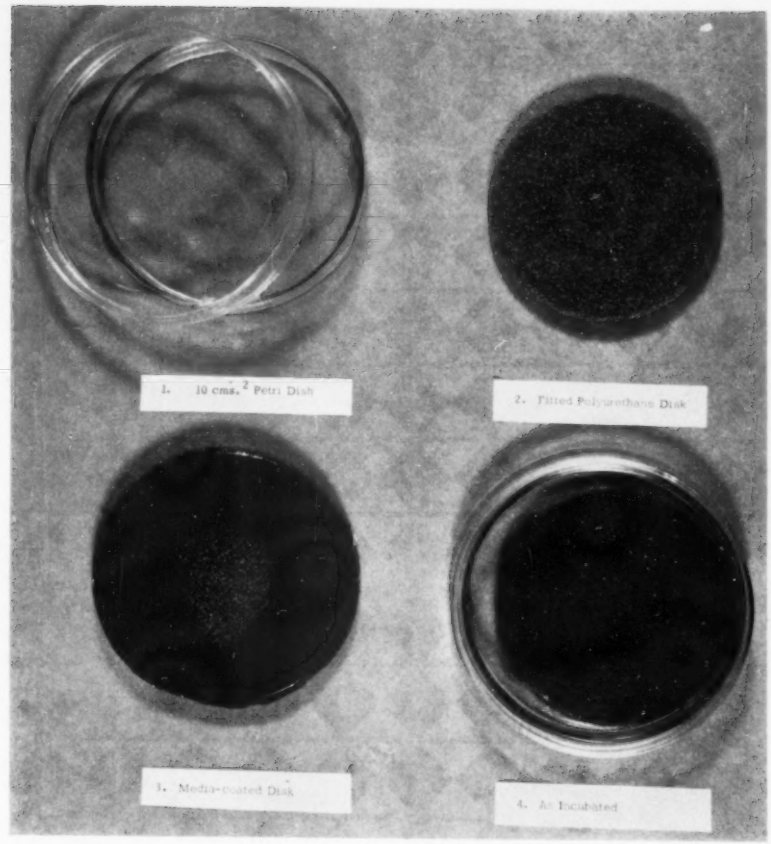
1. 10 cms.² Petri Dish
2. Fitted Polyurethane Disk
3. Media-coated Disk
4. An Incubated

FIGURE 4.

results after one hour in the identical area shown in figure 6. Sieve samplers are excellent for detection of spores, but they are not as good as a slit sampler or Wells air centrifuge for other forms of environmental air sampling.

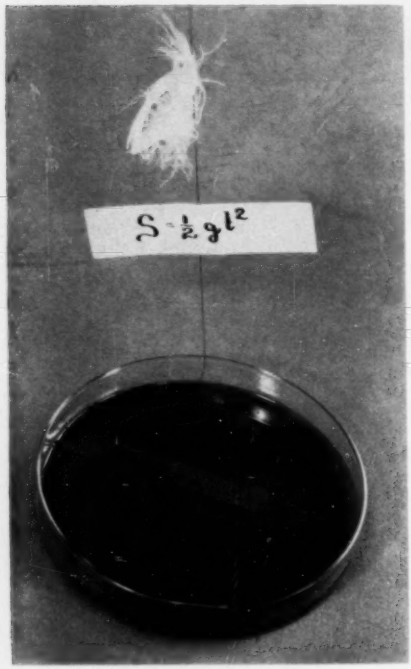

FIGURE 5.

A simple, inexpensive, portable, nonelectrified, and clock-operated slit sampler is shown in figure 9. Its superior efficiency and more accurate recording of the bacteriologic status of a public corridor running past the operating pavilion doors is illustrated in figure 10, in which the slit sampler determination for one hour is compared with the gravity fallout for the same period of time.

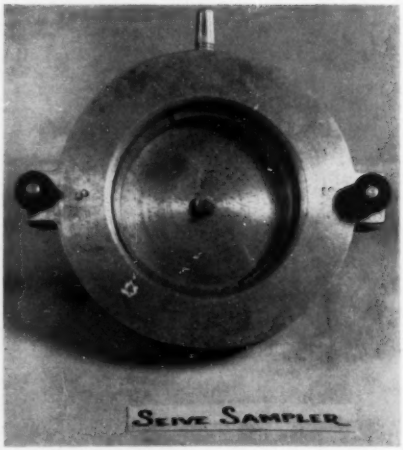

FIGURE 7.

The proper setup for application of the mechanical cleansing process is illustrated in figure 11. The worker must be carefully masked, garbed and bootied, so that he does not leave as much contamination behind as he takes away. The self-contained squeegee mop, the small bucket, and the clean cloth in the worker's hands were autoclaved as a unit. The glass jar contains detergent-germicide solution. The mop handle was wiped clean with this solution before being fastened to the freshly autoclaved mop. A wet pickup microstatic cyclonic filter vacuum cleaner is indicated on the left. Such vacuum cleaners, properly maintained, emit practically sterile air through the outlet filter, and are more efficient at slurry and moisture removal than manual methods. For purposes of economy and for getting a large amount of work done per unit of time and manpower, a mechanical scrubber with a valve-controlled dispenser for the detergent-germicide solution is preferable for use on the floors. Such a cleaning process will leave all surfaces in the essentially clean condition that is exemplified in bacteriologic samples shown in figure 12.

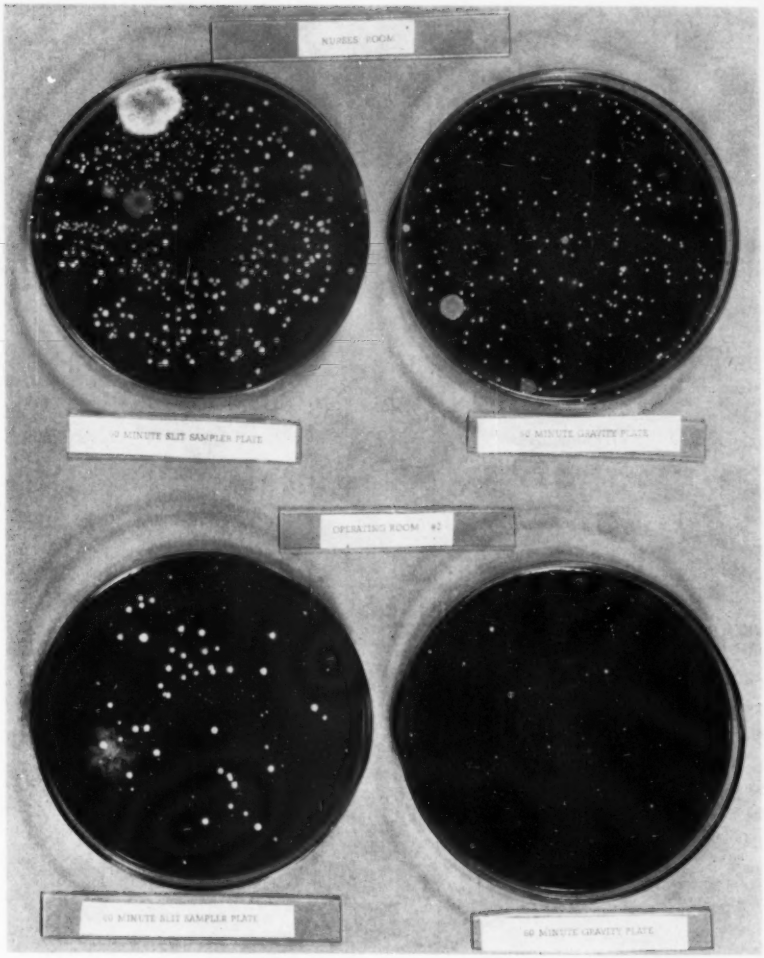
NURSES' ROOM
60 MINUTE SLIT SAMPLER PLATE
60 MINUTE GRAVITY PLATE
OPERATING ROOM #2
60 MINUTE SLIT SAMPLER PLATE
60 MINUTE GRAVITY PLATE

FIGURE 6.

FIGURE 8.

FIGURE 9.

Figure 13 emphasizes the importance of attentive cleaning to all surfaces, cracks and crevices everywhere in the pavilion. Otherwise, these are virulent sources of contamination, as air reaching them picks up dust or particles and recirculates it. The process of cleaning is similarly applied to all furniture and equipment in the pavilion, and they are left in essentially sterile condition, as shown in figure 14.

FIGURE 11.

One can be confident if one follows conscientious application of the foregoing process that the floor cultures of the operating pavilion will look, and be, like those shown in figure 15. The Petri

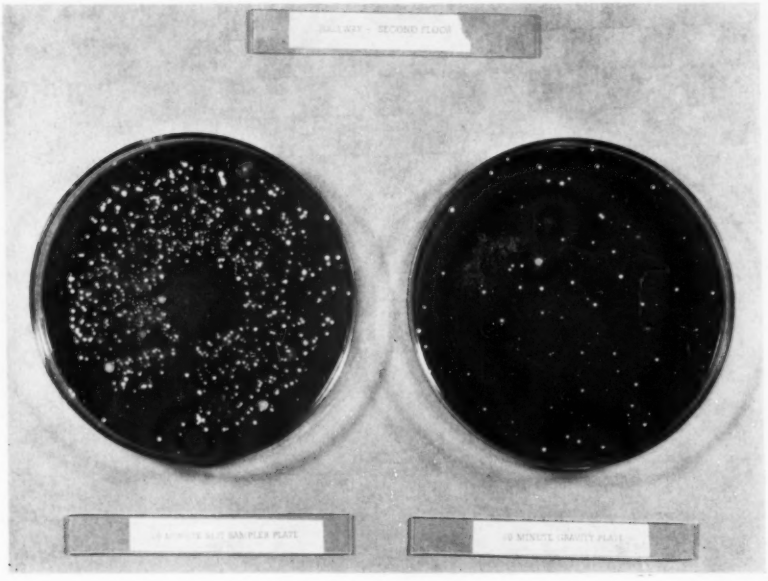

FIGURE 10.

dishes of floor cultures in this figure are arranged in diagrammatic representation of the physical layout of the Huggins Hospital operating pavilion. If there is a properly installed air conditioner system and barrier arrangement in effect, the contained air in the pavilion will also be practically sterile in the areas of patient exposure (fig. 16). Each plate represents the contamination, or the lack of contamination, that had accumulated within twelve hours after the thorough cleaning process of the preceding late afternoon. One may here visualize the effectiveness of the zone concept whereby control becomes increasingly tight as the areas most important to keep sterile are reached.

A diagram of what an operating pavilion air conditioning system should do

FIGURE 13.

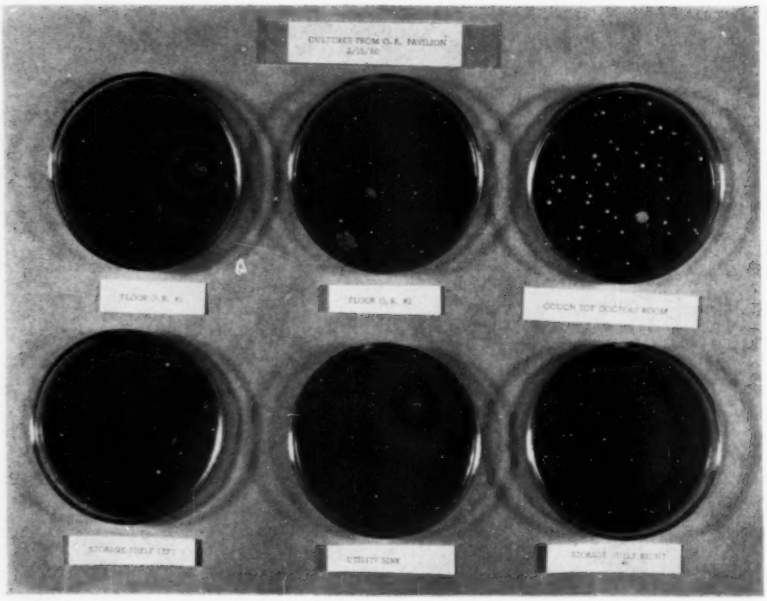

FIGURE 12.

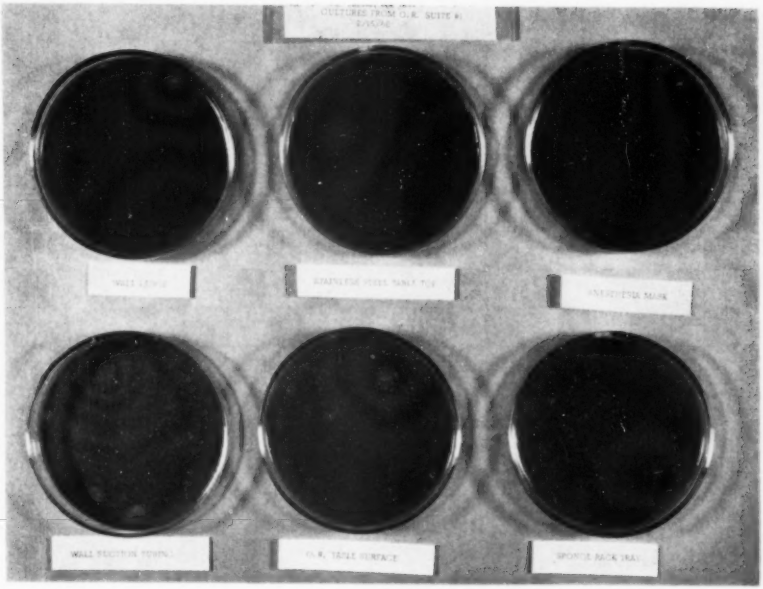

FIGURE 14.

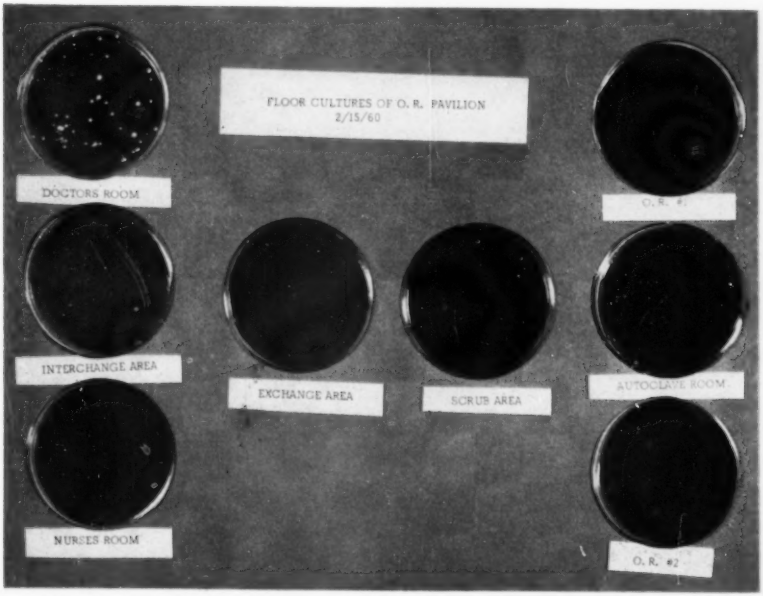

FIGURE 15.

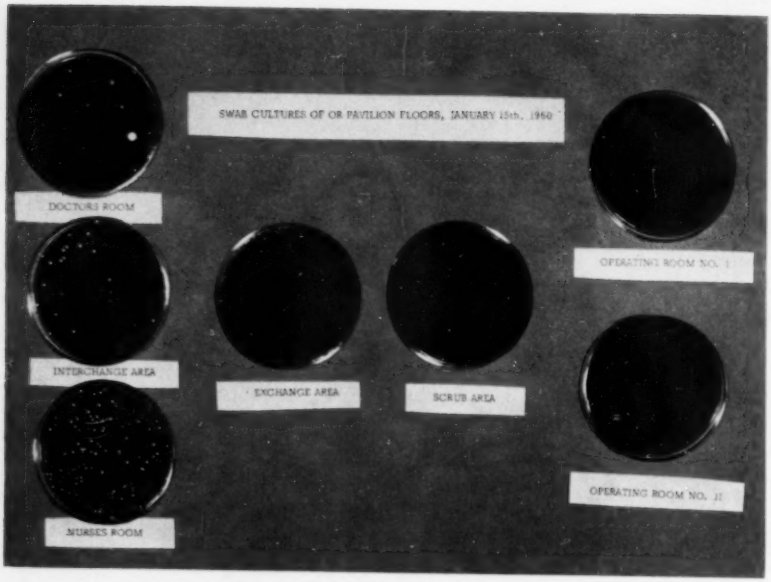

FIGURE 16.

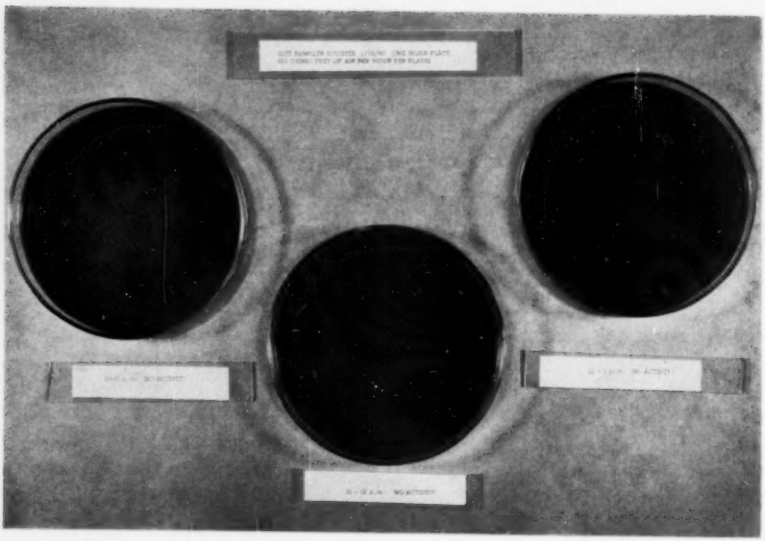

FIGURE 18.

FIGURE 17.

is shown in figure 17. The air must be sterile as it enters, under sufficient pressure so that the flow will be constantly outward and away from the operating room, and it must be changed at intervals variable from four to twelve minutes, depending upon the amount of occupancy.

So long as there is no occupancy or usage, an operating pavilion cleaned and protected, as previously described, will stay clean and essentially sterile for at least twenty-one hours (fig. 18). The room represented in figure 18 was left clean, as described, at 3:00 p.m. on one day, was intercurrently unoccupied and unused, and was still sterile at 1:00 p.m. on the following day, in so far as critical bacteriological testing could determine.

If one wishes to continue a similar state of cleanliness to the extent that practical considerations will permit, then one must require that personnel and patients entering the room, for whatever purpose, be freshly clothed in clean garments, wear a carefully fitted and highly efficient filter mask, and have on their feet coverings that will prevent room contamination from shoes and socks (fig. 19). Extensive testing, over a long period, led us to recognize that by taking this precaution the result would be a consistent and marked reduction in the room contamination in comparison to that which would occur when persons were allowed to enter without such precautions. In figure 20, one can

FIGURE 19.

see this effect, but also can observe that there was a residuum of contamination. This residuum was identified as being shed from armpits, perineal areas, and exposed skin.

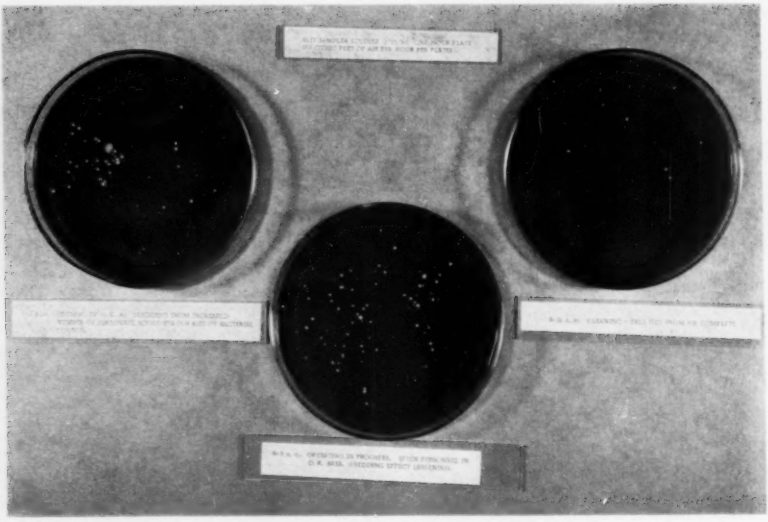

FIGURE 20.

When a simple additional improvement was made—the arms of the sleeves were sealed—there was some reduction. When trousers were worn beneath the sealed armlet quick-change wrap-around gown by both male and female personnel, with the trouser legs sealed about the booties (fig. 21), the contamination from shedding practically disappeared. The bacteriologic condition of the air in an operating room at beginning of usage (6:35 a.m.) was sterile (fig. 22), and continued near sterility until 8:35 a.m., during which time preparations for a gastrectomy had been completed, and the operation had been underway for thirty minutes. One sees that an extremely clean environment continued to exist three hours later (fig. 23), although eight people had been in the room for the three hours and thirty minutes which the operation required. The plate on the right in figure 23 shows the condition of the air when the room had been vacant postoperatively for a period of twenty minutes. This achievement in simple cleanliness can be attained, and is maintained, in our operating rooms each day, every day.

FIGURE 21.

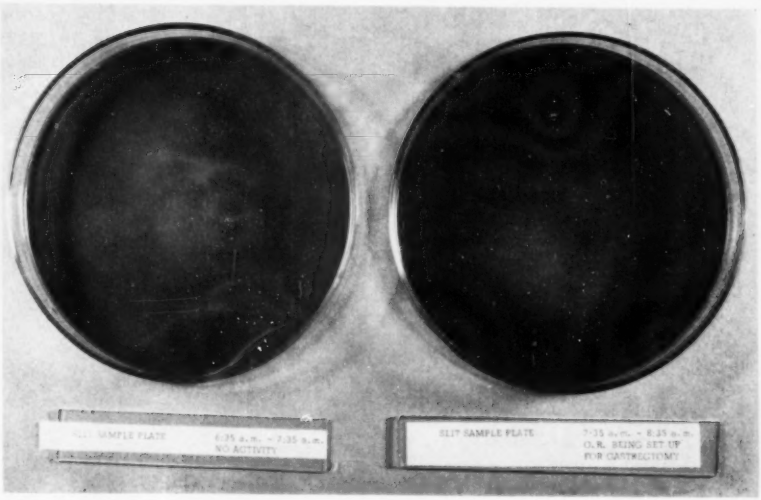

FIGURE 22.

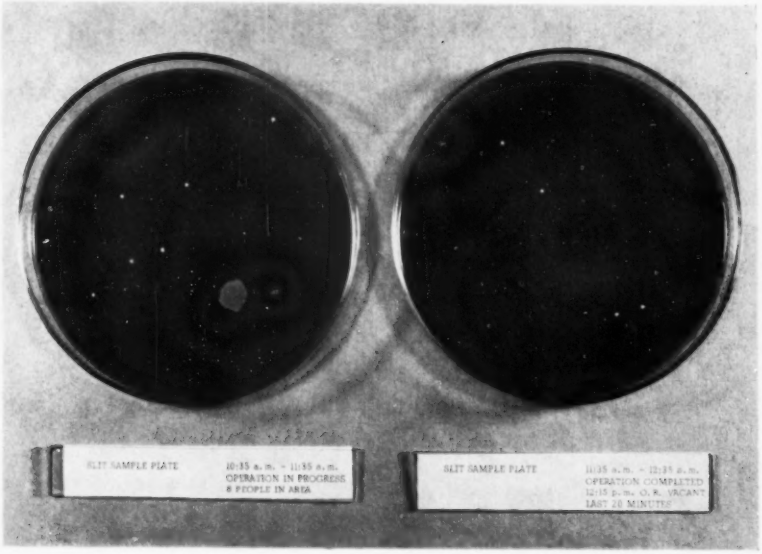

FIGURE 23.

An integral part of the problem of controlling sources of infection, extrinsic to the patient himself, is the preparation and protection of the skin. The statement applies with equal emphasis for the skin of the patient and for the skin of operating room personnel. The technique for hand scrubbing is as follows:

1. Put on a clean and impervious plastic apron to protect the clothing from spattering during the process of cleansing the hands and arms.

2. Wash the hands and arms up to the armlet seal with hot water and a good detergent solution vigorously for one minute, rinsing frequently with clear, clean water.

3. Scrub the nails, fingers, hands, forearms, and arms vigorously with a brush, detergent solution and water for four minutes; rinse with clear, clean water. Dispose of the first brush.

4. Begin with a new brush and scrub for a second period of four minutes, exactly as described above. End with a thorough rinsing with clear, clean water.

5. Rinse the hands and forearms with freshly provided antiseptic solution, from the hands downward to the elbows, allowing the solution, as it is wrung out of cotton pledgets, to run down from the hands over the forearms and off elbows into the scrubup sink.

6. Have an attendant remove the impervious apron.

7. Enter the operating room, where the instrument nurse will provide a series of two sterile towels for drying the hands. This leaves them in condition for putting on gloves without use of powder.

An identical program for preparation of the patient's skin is used in the operating room, with two exceptions: Naturally, an apron is not applied, but instead, an impervious sheeting is placed beneath the patient in the area that is to be prepared for surgery. The next step is cleansing of the skin in the area with gauze soaked in ether for removal of oils, or adhesive remnants. The skin scrub-up is, thereafter, identical to that just described for personnel hand and arm preparation.

There is no magic inherent in any chemical detergent, antiseptic, or other preparation usable on the human skin, that will take the place of a good mechanical scrubbing. As a demonstration of this fact, figure 24 shows that two interested individuals can make a preparation of their hands and arms for surgery that is highly acceptable, both at the beginning and at the end of the procedure, using only Ivory soap and the procedure outlined above. We use detergents because of the residual bacteriostatic effect inherent in them, but we are not deceived into believing that they are a substitute for diligence in mechanical cleansing.

We are not so naive as to accept statements that irradiation of a room with ultraviolet light, or spraying an aerosol into the atmosphere, or painting of some germicide onto exposed surfaces, will sterilize a dirty room. All our evidence is contrariwise, and makes us believe that there are no substitutes for the simple basic principles of mechanical cleanliness and of isolation.

When this regimen is accomplished and kept in force, the substitutes acquire value as supplements; and as supplements only, we use all three. Any example quoted to us of one of these substitutes being primarily responsible for highly satisfactory conditions has

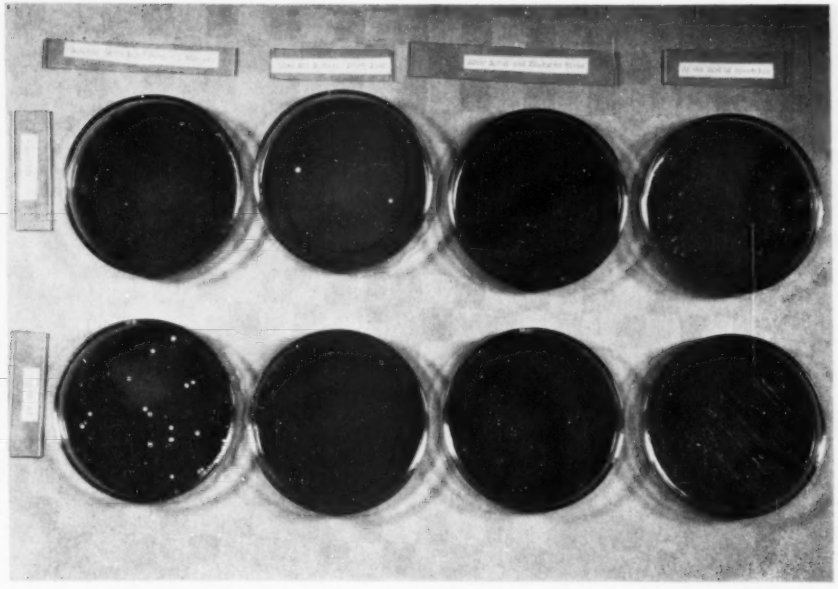

FIGURE 24.

proved, on analysis, to have been preceded or accompanied by strict and good housekeeping.

SUMMARY AND CONCLUSIONS

Any critical care area in any hospital can be kept clean or essentially sterile for as long as the staff, personnel and administration have the interest, willingness, and motivation to do so. The method which is outlined in the foregoing paragraphs is simple, practical, and effective.

The most important factor in control of operating room and hospital infections is cleanliness. Host receptivity and resistance, as influenced by age, by disease process, by organism virulence, and by technique and magnitude of surgical procedure performed, are also of great importance. Walls, furniture, equipment, and floors of critical care areas must be cleaned frequently with an effective detergent-germicide. Maintenance requires reduction to a minimum of new sources of bacteria through dust, fomites, and droplets. Air protection is afforded by an efficient air conditioning system, delivering air under positive pressure, with an exchange every four to twelve minutes, as related to occupancy. Human exhalation is the principal source of air contamination, and is 95 per cent controllable by use of properly fitted filter masks. Personnel entering a critical care area must put on fresh, clean clothing over all skin surfaces. The skin of patients must be similarly covered, except for the area to be prepared for surgery.

Preoperative preparation of the skin of the operating room personnel and the skin of the patient is essential to the

control of infection. A simple and effective scrubbing technique is outlined.

There is no substitute for a strict routine of scrubbing and cleaning of the operating room and adjoining areas. Emphasis is placed on the use of detergent-germicide solutions as cleaning agents and the value of "good housekeeping" to combat infection.

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Symposium: Epidemiology and Control of Hospital Infections

STAPHYLOCOCCAL INFECTIONS

LEIGHTON E. CLUFF, M.D.
BALTIMORE, MARYLAND
BY INVITATION

THAT the staphylococcus can produce infection in healthy and sick persons is so well recognized that it does not require documentation. Its identification as a cause of serious disease in hospitalized patients has led to intensive efforts to characterize its mode of transmission, to control development of infection and to provide effective chemotherapeutic agents. The peculiarities of this bacterium are illustrated by its prevalence in our environment and by its adaptability to environmental conditions rendering the microorganism resistant to antibacterial drugs. Furthermore, in contrast to many other bacterial infections, staphylococcal infection seems to result in little, if any, acquired resistance to subsequent infection.

Associate Professor of Medicine, The Johns Hopkins University School of Medicine and The Johns Hopkins Hospital.

This work was sponsored by the Armed Forces Epidemiological Board, Commission on Streptococcal and Staphylococcal Disease, and supported by The Surgeon General, U. S. Army Medical Corps. Also supported by a contract with the Army Chemical Corps, Fort Detrick, Maryland, and Training Grant 2E-9 from the National Institute of Allergy and Infectious Disease, Bethesda, Maryland.

Acknowledgments: The work reported upon in this paper was done in collaboration with Drs. B. Harvey Minchew, Keiichi Goshi, and Joseph E. Johnson, III.

Presented at the *Joint Session* of the Sixty-Fifth Annual Session of the American Academy of Ophthalmology and Otolaryngology, Oct. 9-14, 1960, Chicago.

In spite of the frequency of occurrence of staphylococcal infection in the general population and in the hospital, it is only recently that efforts have been made to define precisely the incidence of these infections and to define the conditions under which they develop.

To discuss this subject we might ask certain questions for which we have, at present, reasonably satisfactory answers.

What is the incidence of staphylococcal infection in a general hospital and where do these infections occur?

What are the clinical characteristics of the infection, and what are the associated features that may be important in determining its incidence and severity?

Where in the environment are staphylococci found and what modes of transmission of the bacteria may be responsible for initiating infection?

Are there differences in virulence between strains of staphylococci that may be important in determining whether or not infection occurs?

Under present circumstances, what are the most effective agents available for treatment of staphylococcal infection when it develops?

It will not be possible to discuss completely any one of these questions; rather, I will present a brief survey of our

knowledge, as well as defects in our knowledge, and will describe some of our personal investigations that may elucidate some of the parameters of staphylococcal infection. No effort will be made to dwell on facts that are well known.

Historically, it is of interest to read an address by William Welch given before the Congress of American Physicians and Surgeons in 1891, titled *Conditions Underlying the Infection of Wounds*, in which Dr. Welch discussed in detail many of the topics we are concerned with today. His answers to the questions made above were, in most instances, little different than those that can be given today.

The development of bacteriophages, or bacterial viruses, capable of lysing many of the staphylococci responsible for disease in man, and capable of distinguishing between strains of the bacteria, has provided a useful tool for epidemiological investigation, but it has not provided a clear understanding of the pathogenesis of staphylococcal infection. In this sense then, it has been possible to study the transmission of staphylococci and to study epidemics, but the mechanisms involved in production of infection still remain obscure.

DETECTION AND SOURCE OF INFECTION

Staphylococcal infection in man is commonly characterized by localized inflammation with pus formation. The skin is the site of invasion in most instances, although the respiratory tract is the second favorite site for development of infection. Even though the Staphylococcus usually produces a localized lesion, dissemination of the bacteria with bacteremia and metastatic abscess formation occurs occasionally and may produce death. Detection of localized infection due to staphylococci is complicated by the frequent colonization of skin and the upper respiratory tract with the organism. Isolation of staphylococci, therefore, does not always mean infection. Recognition of infection of the skin or upper respiratory tract is possible only when there is pus or cellulitis from which staphylococci are isolated. Whether staphylococci colonizing the skin or respiratory tract are responsible for infection, or whether staphylococci contracted from the environment or another person are responsible for infection is not always known and may not be definable. In our own experience, for example, the strain of staphylococcus found as a cause of furunculosis in nurses can be isolated from the nose in only one third of the instances; in two thirds of infected persons, a staphylococcus different from that causing the furunculosis may be found in the nose. It is possible that the patient with furunculosis may have colonization of his skin with a different staphylococcus than the one colonizing his nose, but this has not been precisely described. Therefore, it remains as a possibility that infection may develop due to a strain of staphylococcus acquired from another person or from the environment, rather than due to a strain colonizing the skin or respiratory tract prior to and at the time of infection.

FACTORS PREDISPOSING TO INFECTION

The fact that many persons harbor pathogenic staphylococci without becoming infected is certainly suggestive that infection may develop only when there has been some alteration in host susceptibility. This is supported by the observation that infection occurs most often in an area of *trauma* or *injury*, as seen in postoperative wound infection. The importance of *foreign bodies*, such as sutures, in predisposing to wound infection is repeatedly observed clinically.[1]

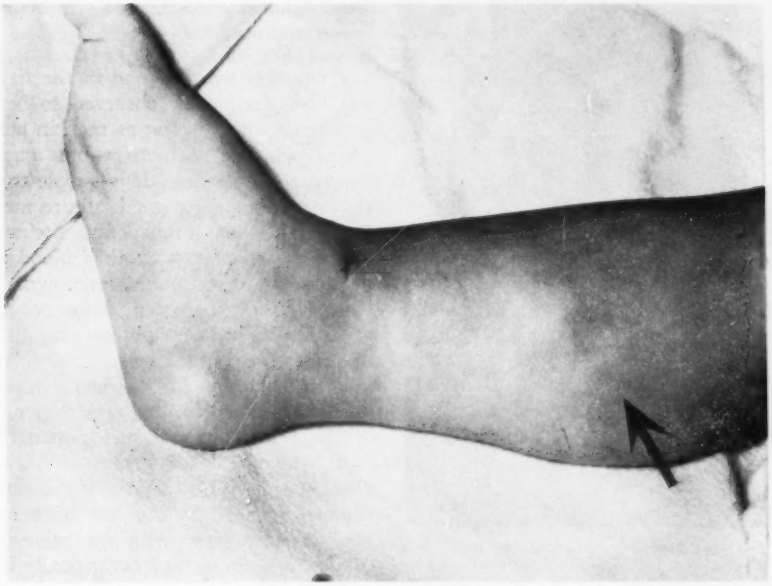

FIG. 1—Staphylococcal infection at the site of insertion and at the tip of an intravenous catheter.

Similarly, the insertion of intravenous catheters has recently been described as a serious cause of staphylococcal bacteremia.[6] Figure 1 shows the leg of a child in whom staphylococcal infection occurred at the site of an intravenous catheter. Of particular interest in this patient was the appearance of an abscess at the tip of the catheter. Unfortunately, infections of this type are only acquired in hospitals, where microorganisms resistant to antibiotics are responsible for most of the infections. Elek[3] has studied the effect of foreign bodies upon the infectivity of staphylococci in normal volunteers and has found that far fewer bacteria are required to initiate infection with silk suture than are required when inoculated into skin without a foreign body present. The mechanism by which the foreign body increases infectivity is not known. From our own studies it does not seem likely that the inflammatory reaction to a foreign body is the important factor. It is possible, however, that the increased tissue pressure and edema about a foreign body may be incriminated, but further studies will be required to elucidate this phenomenon.

The potentially deleterious effects of *adrenal cortical steroids* upon infection has been seen repeatedly and can be shown experimentally.[7] Whether steroids increase susceptibility to infection with staphylococci or merely increase the severity of infection when it occurs is not known. Nevertheless, there are interesting variations in the characteristics of staphylococcal infection in patients receiving steroid therapy. For example, figure 2 shows a deep, ulcerating, sharply

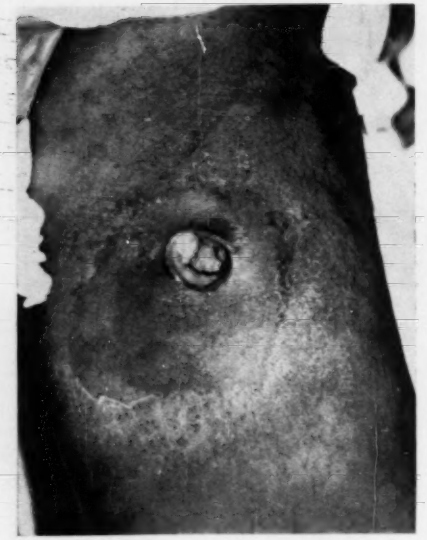

FIG. 2—Staphylococcal infection on the thigh of a patient with systemic lupus erythematosus, showing sharply demarcated edges and the absence of edema and cellulitis.

defined abscess of the thigh in a patient with systemic lupus erythematosus receiving steroids. The interesting feature of these infections is the complete absence of cellulitis or edema around the abscess and the absence of symptoms of infection.

Extravasation of blood in the tissues has been frequently observed to be associated with infection as seen in hemophilia, wherein such infections may be severe and extensive. It is simple to say that hematomas are good culture media, but whether or not this defines the mechanism by which extravasated blood predisposes to infection is unknown. We have had the experience of observing on several occasions staphylococcal infection in the area of the splenic bed following splenectomy for thrombocytopenic purpura. Figure 3 illustrates the course of the disease in one such patient and indicates the development of subdiaphragmatic abscess. These infections are usually confined to the site of hemorrhage resulting from the operative procedure, and there may occasionally be a lag period of several weeks between operation and the appearance of manifestations of the infection. We have seen similar infections develop after extravasation of a blood transfusion.

Tissues of the body probably vary in their susceptibility to staphylococcal in-

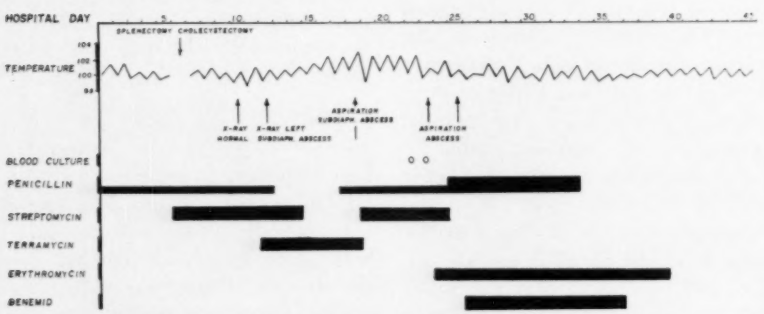

FIG. 3—The progress chart of a patient developing subdiaphragmatic abscess following a splenectomy for thrombocytopenic purpura.

fection. As an illustration, the kidney is a favorite site for localization of staphylococci even when bacteremia has been transient and unassociated with evidence of dissemination of the organism until the renal infection appears. Recently we observed a student nurse who had an axillary abscess that was incised and drained. It healed completely. At no time did the patient have symptoms of systemic infection such as fever, chill, or leukocytosis. About two weeks later she developed a high fever and pain in the right flank. She was found to have a

tis due to the staphylococcus seen frequently following joint inoculations, aspiration or operation. A probable illustration of this is seen in figure 4, showing a patient who developed staphylococcal pyoarthritis of the hip after arthrodesis for a traumatic injury.

Epidemic staphylococcal infection has been repeatedly observed in *newborn infants* and in mothers post partum, probably illustrating a peculiar susceptibility of infants to infection by this microorganism. The mechanism predisposing

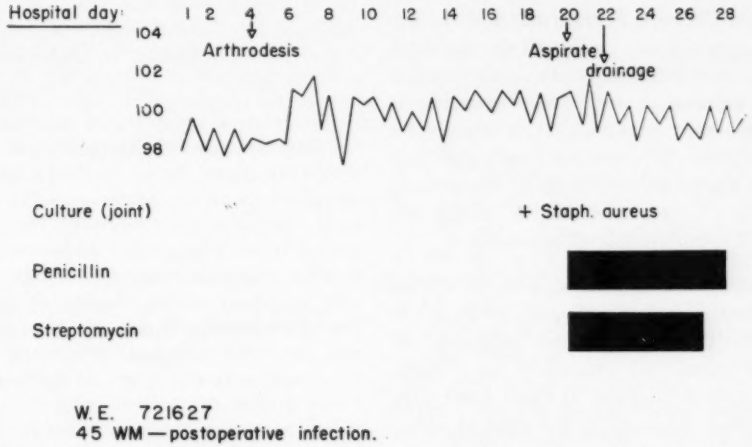

FIG. 4—The progress chart of a patient who developed infection of the hip joint following arthrodesis for a traumatic injury.

right renal abscess due to the same strain of staphylococcus responsible for her axillary abscess. There was no other evidence of metastatic infection than in the kidney. In experimental animals it has similarly been found that the *kidney* is much more likely to become infected with small numbers of staphylococci than are many other tissues.[10] In addition, we have found the *knee joint* of the rabbit to be susceptible to infection by fewer staphylococci than most other tissues thus far studied. This may account for the occurrence of pyoarthri-

newborn babies to infection, however, is not understood.

There are other examples of alterations of host resistance responsible for predisposing to infection by the Staphylococcus, as seen in *influenza* followed by staphylococcal pneumonia, *sinusitis, bronchiectasis,* and *bacterial endocarditis* superimposed on a previously diseased heart valve. It seems amply clear, however, that staphylococcal infection, although occurring in otherwise apparently normal persons, becomes most

problematic in persons predisposed to infection by age, certain associated diseases, trauma, injury, foreign bodies or variation in tissue susceptibility.

INCIDENCE OF INFECTION IN THE HOSPITAL

To define more precisely the incidence of staphylococcal infection in the hospital, we undertook to survey these infections in The Johns Hopkins Hospital during 1959.[8] The over-all incidence of infection over the year was about 1.3 per cent, or 13 infections per 1000 patients. Between February and May there was a noticeable decline in the incidence that was attributable to a decrease in the number of infections occurring in postoperative wounds. The reason for this decline was not clear but could have been due to the increased attention being given to this problem and a corresponding increase in control measures.

As shown in table I, most of the infections were occurring in surgical patients. This was not attributable to the large number of patients in our hospital being operated upon, as illustrated by the fact that although 70 per cent of infections were in postoperative wounds, only 40 per cent of patients in the hospital went to surgery.

Reports have been made suggesting that hospitals are contaminated by particularly virulent staphylococci, and the strain most often incriminated has been bacteriophage type 80/81.[5] During our surveillance only one third of the patients observed were infected with this strain of bacteria, indicating that other strains accounted for the majority of infections. It is important to point out, however, that designation of the 80/81 strain as having "epidemic virulence" is based largely upon the frequency with which it has been found as a cause of outbreaks of infection in nurseries for the newborn.[5]

The over-all incidence of staphylococcal infection acquired by patients in The Johns Hopkins Hospital might be interpreted as an acceptable endemic rate, as it compares favorably with the rates found in other hospitals.[4] However, this is not a true reflection of the problem, a fact we observed when rates of infection were examined in patients of varying age, with different underlying diseases and different types of operations. Some groups of patients seemed to develop infection more commonly than others.

TABLE I

HOSPITAL ACQUIRED STAPHYLOCOCCAL INFECTIONS
JOHNS HOPKINS HOSPITAL, 1959

TYPE OF INFECTION	NUMBER OF INFECTIONS	PATIENTS	
		NUMBER	PER CENT
Newborn and Post Partum	10	10	4.3
Postoperative Wounds	167	165	70.5
Others	59	59	25.2
Totals	236	234	100.0

With increasing age, there was a trend toward increasing frequency of infection in both the surgical and medical wards of the hospital. That age, in and of itself, may not be the only factor in this increased incidence of infection was suggested when figures for the different illnesses presented by patients in varying age groups were examined. It was found that with increasing age there is an increasing incidence of those diseases probably predisposing to staphylococcal infection. The influence of these underlying diseases upon the occurrence of infection in the hospital was investigated, and it was found that postoperative or surgical infection occurred most commonly in patients with neoplastic disease or burns; in these circumstances, the attack rates were from eight to ten times that for the whole hospital population. Furthermore, the types of surgical procedures performed appeared to have an influence on the occurrence of staphylococcal infection. The highest attack rates were in patients having radical neck dissection for carcinoma of the neck; following amputations, many of which were done for neoplastic disease; and following pneumonectomy, done largely for carcinoma of the lung.

Although it might be suspected that postoperative wound infections would develop more often following prolonged surgical procedures, no such relationship was found. The duration of operation was as long in those who acquired an infection as in those who did not.

Five per cent of patients with postoperative wound sepsis developed bacteremia; approximately 10 per cent of deaths among those developing infection could be directly attributed to the infection, indicating the seriousness of the disease when it occurs.

As pointed out earlier, staphylococcal infection cannot be diagnosed solely by cultural recovery of the bacteria. Rather, it is dependent upon recognition of pus or cellulitis. For this reason, it is not always a simple matter to identify infection. In our experience, and in previous reports, the time lapsing between operation and recognition of a wound infection has been about seven days.[4,8] Elek[3] has shown in volunteers inoculated intradermally with staphylococci that the onset of infection and development of an abscess occur usually less than seventy-two hours after the injection of organisms. This discrepancy between the experimentally observed lag period and the lag period between operation and recognition of infection raises some speculation that the infection may not begin in the operating room but may begin afterwards.[4] There are many factors that influence early recognition of infection, including the frequency with which incisions are observed after operation, the presence or absence of a dressing, and the size of the bacterial inoculum. Furthermore, we have found that the administration of prophylactic antibiotics to the patient preoperatively may delay appearance of infection. For example, the period between operation and recognition of infection was two to three days longer in patients who received antibiotics preoperatively than in those not receiving prophylactic chemotherapy.

From the study of postoperative staphylococcal infection it has been found that the infection occurs more commonly in older persons, patients with certain types of associated diseases in which there is a lowering of resistance to infection, particularly in patients with cancer or burns, and in individuals on whom specific types of operative procedures are performed. This suggests that an important determinant in the occurrence of staphylococcal infection is a change in resistance to infection attributable to associated illnesses.

Although the majority of staphylococcal infections acquired by hospitalized patients are seen postoperatively, there are similarities between the conditions in which these infections occur and the conditions or features of infections observed in patients not operated upon. The commonest type of infection seen, *other* than postoperative, post partum or infection of the newborn, is furunculosis; bacteremia occurs almost as often. Examination of the diseases associated with the development of staphylococcal infection in nonsurgical patients demonstrates the greater frequency of these infections in persons with certain types of illnesses. For example, in patients with cancer, diabetes mellitus, cirrhosis of the liver, dermatitis and systemic lupus erythematosus, the attack rate of staphylococcal infection exceeds that occurring in the hospital as a whole by three to twenty-five times, indicating that these individuals, although exposed to the same risk of infection as other patients, are being infected more commonly. This finding substantiates the importance of associated illnesses as a factor in predisposing the patient to staphylococcal infection. The way in which neoplastic disease, diabetes and systemic lupus erythematosus increase susceptibility to infection is far from clear. If we were able to understand their influence on susceptibility to infection, we would be closer to knowing how to control or prevent infection.

From these observations of the impact of underlying disease upon the occurrence of staphylococcal infection, it is possible to conclude that the frequency of these infections in hospitals may be due as much to the concentration of susceptible persons in one area as to difference in strains of staphylococci found in and out of the hospital. Whether or not these susceptible individuals would be as likely to acquire such an infection outside the hospital is not known.

A comparison of the over-all incidence of infection in the hospital with the incidence in patients with exfoliative dermatitis, systemic lupus erythematosus and other diseases is revealing. Although an over-all incidence of 1.0 per cent might be considered an acceptable endemic rate, an incidence of 25 per cent in dermatitis is indicative of epidemic disease in these patients. The situation is similar with other underlying diseases and forces a re-evaluation of the problem of staphylococcal infection in hospitals.

ANTIBIOTIC THERAPY OF STAPHYLOCOCCAL INFECTION IN THE HOSPITAL

Of particular clinical importance is the influence and effectiveness of antibiotics upon staphylococcal infection. The difference between the percentage of penicillin-resistant and other antibiotic-resistant organisms found in the out-patient population as compared with the in-patient hospital population is largely responsible for the serious concern over infections due to this bacterium in hospitals and the lesser degree of concern outside the hospital. For example, in our own experience, only one third of out-patients are found to harbor penicillin-resistant staphylococci, whereas 84 per cent of patients in the hospital harbor staphylococci resistant to penicillin. The implication of this observation can be seen when we examine the survival rate from bacteremia in patients infected with an antibiotic-resistant organism and the survival rate in patients infected with an antibiotic-sensitive staphylococcus. Bacteremia due to strains which resisted antibiotics was associated with a survival of only 14 per cent of patients, whereas 77 per cent of patients with bacteremia due to antibiotic-sensitive organisms survived. This

finding is probably attributable more to the effectiveness or noneffectiveness of therapy than to differences in virulence of the antibiotic-resistant and antibiotic-sensitive staphylococci. In this analysis the presence of bacteremia was in and of itself an illustration of infection by a pathogenic invasive staphylococcus.

There are differences in the susceptibility of staphylococci to antibiotics depending upon the bacteriophage type of the organism.[9] The 80/81 bacteriophage type or "hospital strain" is by far the most uniformly resistant to antibiotics. Virtually all of the staphylococci belonging to this bacteriophage type are resistant to penicillin in a concentration of 250 units per milliliter, a level almost impossible to obtain in the blood clinically. Several antibiotics, including erythromycin, novobiocin, chloramphenicol, ristocetin, oleandomycin, and sigmamycin, have a distinct bacteriostatic effect on most strains of staphylococci. Although these antibiotics may suppress the growth of staphylococci and impede the progress of infection, they would be expected to be less effective than drugs capable of killing the bacteria, but there are few antibiotics with a distinct bactericidal effect. No antibiotic is uniformly bactericidal for the staphylococcus. In concentration of 50 units per milliliter or more, penicillin can effectively kill twenty to forty per cent of staphylococci belonging to bacteriophage types other than 80/81. On the other hand, in our experience, bacitracin and vancomycin are the only other two antibiotics with a reasonable bactericidal effect on the staphylococcus. These are as effective against the 80/81 strain as other bacteriophage types. For this reason, in *severe* staphylococcal infection acquired in the hospital, we prefer beginning treatment with vancomycin. Then, if the staphylococcus proves sensitive to penicillin, vancomycin is discontinued and treatment continued with penicillin. It is important to point out that even vancomycin and bacitracin have a bactericidal effect against only 40 per cent of the strains isolated in the hospital. Therefore, we have no optimally effective chemotherapeutic agent for 60 per cent of the severe staphylococcal infections. Staphcillin is proving to be as effective as vancomycin in treatment of penicillin-resistant staphylococcal infections.

The adaptability of the staphylococcus to its environment has been amply illustrated by its ready capacity to become resistant to almost all antibiotics, thus rendering the life of usefulness of new drugs very short. For this reason, it is important to analyze the changing antibiotic resistance of the organisms isolated in hospitals. In comparing the data on antibiotic sensitivities of staphylococci obtained in our laboratory between 1955 and 1958,[9] it has been possible to observe this changing spectrum of drug effectiveness. Little over-all change in the sensitivity to penicillin of staphylococci isolated from infected hospitalized patients was noted between 1955 and 1958, although the number of strains susceptible to the drug has remained very low. Similarly, there has been little change in sensitivity of strains to erythromycin, tetracycline, chloramphenicol, vancomycin, and oleandomycin; although, as pointed out before, except for vancomycin and possibly novobiocin, these antibiotics have little bactericidal effect upon the staphylococcus. It is of interest that frequency of isolation of strains sensitive to novobiocin was greater in 1958 than 1955, possibly, though not certainly, reflecting a low usage of this drug in the hospital.

EPIDEMIOLOGICAL CONTROL OF INFECTION IN THE HOSPITAL

If staphylococcal infection in the hospital is as we have defined it; namely, a

problem involving specific groups of patients rather than the whole hospital population, then our methods of control will have to be accordingly directed. The majority of the infections are in postoperative wounds; therefore, we must specifically direct our attention to that area. An indirect control measure is the institution of a surveillance program for detection of infections. As was illustrated by our own surveillance, and as was similarly found at the Hospital of the University of Pennsylvania,[4] such a surveillance of staphylococcal infection effected a decline in incidence of infection. In our hospital this decline was most noticeable on the surgical service. The education and corresponding increase in awareness of the problem of hospital infections as provided by a surveillance program will, in most instances, improve methods of control.

Although the mode of transmission of staphylococci important in leading to infection has not been precisely defined, it has been shown in certain outbreaks of surgical wound infections and in nurseries for the newborn that specific individuals with staphylococcal infection may be the important source of disease in patients. Such infected persons should not be allowed to come into contact with patients in the operating room or with highly susceptible patients such as those with burns and exfoliative dermatitis. Although personnel who are carriers of staphylococci, but not obviously infected, have been pointed out as the source of infection in epidemics in newborn infants, this association has not been so clearly defined among other susceptible groups of patients. The control of carriers of staphylococci may be particularly important in handling patients most susceptible to infection.

An obvious source of staphylococci in the hospital environment is the patient with a suppurative staphylococcal infection. All such patients should be isolated. Their dressings, bed clothes and gowns should be separately handled and sterilized. The examiner should wear gloves, gown and mask when examining these patients.

Besides controlling the infection by isolating infected patients and carriers of staphylococci, as briefly outlined above, consideration has been given to means of cleaning the air, walls, floors, and ceilings of hospitals. Whether or not these sources of staphylococci in the environment are important, however, is still unknown and any conclusions about air conditioning systems, paints or other antiseptics are unwarrantable. A thorough cleansing with soap and water or with detergents, and adequate ventilation of hospital facilities are suggested to combat possible contamination from these sources.

As mentioned before, prophylactic antibiotics cannot be relied upon to control staphylococcal infection. Furthermore, there is as yet no definitive information to indicate that specific immunization will control infection with these bacteria. Experimental observations suggest that a further evaluation of staphylococcus toxoid (alpha hemolysin) may prove fruitful in providing a means of controlling *certain types* of staphylococcal infection.[2]

SUMMARY AND CONCLUSIONS

Surveillance of the over-all incidence of staphylococcal infection in the hospital does not truly reflect the nature or the solution of this problem. Patients with lowered resistance to infection are primarily involved in the occurrence of staphylococcal infections. The patients most likely to acquire infection are those undergoing surgery. Particularly susceptible are those with cancer, burns,

dermatitis or diabetes mellitus, and newborn infants. Protection of persons susceptible to staphylococcal infection would have a greater impact upon the incidence of infection in hospitals than would efforts directed toward control of the whole hospital environment. Whether or not refined methods of air purification would significantly reduce the incidence of staphylococcal infection is not known, as a controlled study has not been made. It is not known whether the airborne route is important in transmission of the staphylococci which are responsible for infection.

The inadequacy of our present antibiotic therapy for staphylococcal infection is clear, and emphasis must be placed on careful surgical care. The capacity of the microorganism to become resistant to antibacterial drugs has prohibited the development of effective chemotherapeutic agents which would have a distinct bactericidal effect upon the Staphylococcus. The ubiquitousness of the Staphylococcus in the environment, however, makes it very unlikely that infection by these organisms will be satisfactorily controlled by efforts directed at sterilizing the air, surfaces of rooms, or human beings. To control the problem of staphylococcal infection we must find not only new antibiotics, but means of building resistance to bacterial invasion in susceptible individuals.

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Symposium: Epidemiology and Control of Hospital Infections

BACTERIOLOGY IN RELATION TO HOSPITAL INFECTIONS

HENRY F. ALLEN, M.D.
BOSTON, MASSACHUSETTS

IF genius is the capacity for taking infinite pains, then a measure of genius is required of every surgeon. That infinite pains can reduce the infection rate has been demonstrated by Adams,[1] Hart, Walter and others. A factor common to such regimes has been the indoctrination of all participating personnel and the rigid enforcement of discipline in the operating suite. The results obtained by these surgeons prove that postoperative infections are no longer inevitable. Rather, an unfavorable rate of hospital infection appears more and more to be a direct manifestation of failure to take necessary precautions.

The microbiological sciences are the foundation of aseptic technique and the principal aid to the epidemiology of surgical infections. They help to establish the cause of infections, to trace their spread, to select and guide their therapy, and to set up effective measures for their prevention. Thus the hospital laboratory has an essential part in diagnosis, therapy, epidemiology and prophylaxis.

From the Department of Ophthalmology, Massachusetts Eye and Ear Infirmary and Harvard Medical School.

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DIAGNOSIS

Proper application of the techniques of diagnostic bacteriology can determine the difference between life and death: life, if a lethal pathogen is recognized on smear or recovered early in culture; death, if cultures are reported negative too early or positive too late. Failure to include a broth culture may mean failure to recover a pathogen overgrown by saprophytes on an agar plate. When inocula are small, a plate culture may show no growth, while a broth culture of the same swab will often reveal a pathogen. False negatives from starvation media, false positives from harmless normal inhabitants—these are only two of the pitfalls awaiting the inexperienced or unwary. Yet, too often diagnostic bacteriology is left in the hands of technicians, registered or unregistered, sometimes overworked and underpaid, often of limited educational and scientific background, who have little appreciation of the clinical importance of their findings and little time or incentive to acquire it. While it is impossible to have a Koch or a Zinsser in the laboratory of every county hospital, or a Lister or a Holmes on every surgical staff, hospitals would do well to foster the team concept of a bacteriologically minded surgeon working with a clinically oriented bacteriologist, a concept well exemplified by Adams and Fahlmann at Huggins Hospital, and by Walter and Knudsin at the Peter Bent Brigham Hospital.

THERAPY

Specific antibiotic therapy and chemotherapy have highlighted the role of the hospital laboratory in the selection of drugs and in evaluation of their effectiveness. An alert technician can often save twenty hours in obtaining the results of sensitivity tests by streaking a four-hour broth culture on agar and placing diagnostic discs directly on the plates. When the patient's clinical response fails to parallel expectations based on reported sensitivity of the causative organism, a more nutrient medium may reveal the same strain to be resistant to the drug or drugs employed. Meltzer and Kelemen[5] reported a fatal case of pyocyaneus osteomyelitis of the temporal bone, mandible and zygoma secondary to external otitis in a diabetic. The strain of *Pseudomonas aeruginosa* appeared sensitive (on a dehydrated, reconstituted medium) to several antibiotics. In spite of massive dosage with three of these antibiotics, the patient's condition grew steadily worse. When sensitivity tests were repeated on a beef-heart infusion agar recently prepared in the laboratory, the strain was found to be resistant to all available antibiotics.

EPIDEMIOLOGY

Simple epidemiologic studies, such as can be performed by any well-trained technician, often lead to solution of annoying or serious problems. For example, a persistent series of external ear infections appeared in a busy postoperative clinic. The wounds were never infected at the time of the first dressing, but when they were dressed the second time they were found to be contaminated with *Aspergillus niger*. Various deficiencies of instrument and dressing technique were remedied without effect on the march of infections. Then the hospital bacteriologist sampled the air in the treatment room and reported many colonies of *Aspergillus niger*. The simple expedient of leaving the windows open at the top and bottom during the night ended the epidemic at once.

In the absence of facilities for phage typing of staphylococci, strong inferences can be drawn from comparison of patterns of antibiotic sensitivity of strains of staphylococcus isolated from infections and of those obtained from the environment. In this manner our bacteriologist was able to trace the source of three eye infections, which occurred within two days, to the nose of the operating surgeon.

In a third instance, two otorhinolaryngologists reported that patients were returning to their offices with purulent discharge forty-eight to seventy-two hours after tympanic paracentesis for serous otitis. Clinical cultures from one office showed *Escherichia coli;* from the other office, *Bacillus proteus*. In each instance the offending organisms were cultured from the "sterilizing" solution in which the paracentesis knives were maintained. Both surgeons reported no further infections after buying small hot-air oven sterilizing units for their offices. In each of these small outbreaks the hospital bacteriologist, Miss A. B. Mangiaracine,[4] suggested the mode of transmission and confirmed it by ordinary culture methods.

Finally, the important study of Khorazo and Gutierrez[3] has identified the conjunctiva and cutaneous flora of surgical patients as a principal source of pathogenic staphylococci in postoperative intraocular infections.

PROPHYLAXIS

The cooperation of the hospital bacteriological laboratory is indispensable to the hospital infections committee. Sterility testing of instruments, supplies

and medications, and environmental surveys of all parts of the hospital are the principal functions of the laboratory in preventing the occurrence and spread of infections. These functions should be performed according to a definite schedule and also at random to detect breaks in sterile technique. The hospital kitchen should be included in the study of environmental conditions. Bacteriologic controls of autoclave procedures in the central supply room and in the hospital pharmacy should be forwarded to the laboratory with unfailing regularity. For purposes of sterility testing, it is essential to employ resistant spores, preferably those of *Bacillus subtilis* (var. niger) and *Clostridium sporogenes.*

Environmental surveys should include air samples, surface swabs from walls, floors and furniture, contact plate cultures of blankets, sheets and mattresses, membrane filter counts of the contents of bedside carafes, and studies of suspect areas or objects wherever they may be. Studies such as those of Adams and Fahlman[1] should not be regarded as simply a research project but as a practical means of maintaining a constant check on the effectiveness of aseptic technique.

Although evaluation of new products is not an ordinary function of the hospital laboratory, it can reveal that producers' claims, even those fortified by independent scientific studies, do not always stand up under the test of other independent studies, some of which are within the scope of the hospital laboratory. Our own experience in testing various compounds and certain devices has repeatedly shown the value of maintaining a skeptical attitude toward the efficiency of "cold" sterilizing processes and of systems of environmental decontamination which depend on chemicals of alleged permanent efficiency or permeating ability, whichever implication the user chooses to accept.

COMMENT

The prophylactic value of environmental disinfection combined with high standards of personal hygiene has been demonstrated by those who have applied these techniques with meticulous care to general surgery. The specialized surgery of the eye and of the ear demands no less exacting standards of environmental control. Our limited knowledge of epidemiologic mechanisms in these special fields points to three main sources of operative infection: (1) the personal flora of the members of the operating team, especially those of the respiratory tract; (2) the personal flora of the patient, especially that of the conjunctival sac, the respiratory tract and the external ear canal; and (3) pathogenic contaminants multiplying in solutions which contact open wounds, especially pyocyaneus organisms present in solutions which are used for their supposed antiseptic or sterilizing properties. All of these sources can be detected by laboratory procedures and controlled before or during surgical procedures by existing techniques.

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Symposium: Epidemiology and Control of Hospital Infections

INFECTIONS WITHIN HOSPITALS FROM THE STANDPOINT OF THE HOSPITAL ADMINISTRATOR

DEAN A. CLARK, M.D.
BOSTON, MASSACHUSETTS

BY INVITATION

FROM the standpoint of the hospital administrator, infections arising within the hospital are, quite simply, a nightmare. This doesn't mean, of course, that he throws up his hands in despair and does nothing about them. But it does mean that there is nothing—except perhaps a complete power or water failure—about which a hospital administrator is more apprehensive and which he is more eager to prevent. Unfortunately, the prevention or elimination of infections from a hospital is a lot trickier than preparations for stand-by power or water. No doubt I have received this much appreciated opportunity to discuss hospital infections because I happen to be the chairman of the Committee on Infections within Hospitals of the American Hospital Association.

What, then, is the role of the hospital administrator in regard to hospital infections? In the first place, it is well to remember that when we say "hospital administrator," we are referring to persons with varied backgrounds. Most are not physicians, though some are. Many are graduate nurses; some are accountants; many are trained (or experienced) only in the specific field of hospital administration. The specific ways in which a particular hospital administrator deals with the problem of infection will, therefore, depend in large part upon his background. But it seems to me that there are certain principles which all hospital administrators, no matter what their backgrounds may be, should follow.

First of all, there is the question of who has responsibility for dealing with the problem. It seems clear that the over-all responsibility belongs to the hospital administrator and to him alone, acting with his Board of Trustees or other governing body. No other person (Chief of the Medical Staff, for instance) should try to assume over-all responsibility. Hospital administrators must accept this fact and act accordingly, although some may be loathe to do so. The *initiative* for action should come from the administrator. If he does not take it, someone may have to prod him, but he should take it.

Secondly, this is a task no administrator can perform alone (even if, as must be rare indeed, he is a bacteriologist). Dealing with infections is a supreme example of the need for the cooperation of people from many departments of the hospital. Medical staff, nursing service, laboratory, housekeeping, maintenance, dietary, medical records, and out-patient department personnel are some of them. While the administrator has the over-all responsibility, he will need the assistance of a strong

General Director, Massachusetts General Hospital.

Presented at the *Joint Session* of the Sixty-Fifth Annual Session of the American Academy of Ophthalmology and Otolaryngology, Oct. 9-14, 1960, Chicago.

committee with representation from the various departments whose cooperation is required. In spite of the shopworn jokes about a committee not being likely to fly the Atlantic, control of infections in a hospital is one situation which can be dealt with only through a committee composed of persons with various specialized skills and responsibilities. Only in this way can the host of complex factors, professional and nonprofessional, be so organized as to bear effectively upon the problem at the proper time and place.

Thirdly, hospital administrators must recognize that while the problems associated with infections, particularly those involving the Staphylococcus may loom large within a hospital, this is a community problem, not one limited to a particular hospital. Perhaps the easiest way to illustrate this fact is to point out the seemingly simple matter of obtaining information about the occurrence of staphylococcal infection arising within a hospital. People ask, "Why not simply have a rule that all such infections must be reported on an appropriate form?" This is not as easy as it sounds; some people may try to conceal the infection, or the infection might not be recognized, especially when it occurs in the medical staff or hospital personnel. But the real problem in dealing with infections, and one which shows that staphylococcal disease is often a community problem, is the fact that the manifestation of many staphylococcal infections appear only after the patient has been discharged from the hospital. Approximately half of the infections occurring in a series of 3,336 presumably clean inguinal herniorrhaphy cases performed at the Massachusetts General Hospital during the past twenty-one years were not apparent until the patient's return visit to the clinic. The infections were not all of the staphylococcal strain, but this points out that without a follow-up of discharged patients, the hospital will never know the number of infections which occur.

The hospital administrator must plan a follow-up of at least a random sample of the patients discharged from his hospital. To do this he must make suitable arrangements for the collaboration of his medical staff, other hospitals in the community and the health department. Otherwise, patients who are not hospitalized or who are hospitalized in a hospital different from the one in which the infection arose, or persons who have not consulted any physician but whose infection was recognized and reported by a patient with a satellite case of infection that was seen by a physician will be lost from the series.

There are many other community aspects to the problem of staphylococcal disease. The number of satellite cases may be a serious community problem. (Fairly large numbers have been found wherever studies have been made, such as those of Wentworth in Ohio.) The presence of infections caused by epidemic strains of Staphylococcus anywhere in a community is a threat to every hospital in it. Publicity which raises undue alarm about the problem may do a great deal of harm. On the other hand, appropriate public education designed to promote understanding rather than fear and to gain the cooperation of the public in defining and controlling the problem may be most beneficial. Legal problems may become important. As to these, I feel strongly that we, as hospital administrators, are obligated first to find out about infections in our hospitals, irrespective of the legal consequences. Surely we would be guilty morally, if not legally, of neglect if we did otherwise. The hospital administrator must be well aware of all these community aspects, and many more, and be prepared to take his proper role in dealing with them.

Finally, the hospital administrator

must see that appropriate action is taken within and outside his hospital to control any problem of infection that may be discovered. Most of the details of this action will have to be carried out by someone else, but it is the hospital administrator's job to see that they are carried out promptly and correctly, and —in the case of the many procedures in the control of infection which must be pursued day in and day out—that they are continually carried out. I shall not attempt to go into the details today. As you know, many of the details have been set forth in a bulletin of the American Hospital Association and in another of the Joint Commission on the Accreditation of Hospitals. A manual on infections within hospitals is in preparation for the American Hospital Association.

Two special points deserve consideration. The first is the necessity for the strict isolation of any patient known to have an infection—particularly with an epidemic strain of Staphylococcus—whether it was acquired in the hospital or outside. In the American Hospital Association Bulletin this point was perhaps not emphasized sufficiently. It is obvious that such precautions should always be observed; yet I fear that some of us may have grown careless in the application of this elementary safety measure.

The second point is that of organized training in the best methods of control for staff members, nurses, and other personnel. This may be done by many means, but probably one of the most effective is the use of training films. They are expensive. In a field such as this, where new and superior techniques may be expected to develop rapidly through the results of research, films may have to be altered frequently. Several good ones have been made. Among them is "Hospital Sepsis: A Communicable Disease," edited by Dr. Carl Walter and sponsored jointly by the American Hospital Association, the American College of Surgeons, and the American Medical Association. Another film I want to mention is soon to be released by the Aetna Life Insurance Company. It also is sponsored by the American Hospital Association and is based on the work of Dr. Adams at Wolfeboro, New Hampshire.

Let us not forget that there are many other sources of infection besides the Staphylococcus. Not many years ago we had an occurrence of ten cases of Salmonella infection in the Massachusetts General Hospital. Incidentally, they illustrate the importance of community effort in controlling hospital infections. These cases occurred at such scattered locations in our buildings and spread over such a length of time—ten or twelve weeks—that none of us was aware that we had an outbreak on our hands until we were alerted by the State Health Department, which had been accumulating our reports. It was found that all the infected patients had one thing in common: at one time or another they had all been tube-fed. Yeast powder, the one ingredient in a tube feeding that cannot be autoclaved or pasteurized and still function as it should was the source of infection. A culture from the yeast barrel located the bacteria, Salmonella. Measures to control spread of infection were instigated, and the epidemic was stopped.

Altogether, the problem of infections within the hospital is as complex as any which a hospital administrator can be called upon to face. It requires acceptance of responsibility and initiative; it involves most, if not all, departments of his institution; it is always a community as well as a hospital problem; and, it requires his leadership for prompt, effective, and often continuous action. It is a real and permanent challenge to us all.

LORENZ E. ZIMMERMAN, M.D.

XVII Jackson Memorial Lecture

THE REGISTRY OF OPHTHALMIC PATHOLOGY: PAST, PRESENT AND FUTURE

LORENZ E. ZIMMERMAN, M.D.
WASHINGTON, D. C.

THE name of Edward Jackson is famous to all of you. I feel somewhat chagrined that I have come to learn about this great man only during the past several years. Unlike the previous persons whom you have honored by your invitations to be Jackson Lecturers, I was not trained in ophthalmology. The Jackson name was not the "household word" to me that it was to them. As a matter-of-fact, until 1953, I knew very little about ophthalmology or of the great men who were responsible for this speciality's having attained the remarkable position that it has today. I feel very humble, therefore, in coming before you this morning. It is the organization which I represent that deserves this honor—not me personally. For this reason, I have chosen for my presentation this morning, "The Registry of Ophthalmic Pathology: Past, Present and Future." I do believe that the Registry and, particularly, the *Army Medical Museum* which made this Registry possible, share with such eminent clinicians as Edward Jackson an important place in the history of American Ophthalmology. Pathology was not one of Jackson's personal hobbies, but it is evident that he commanded the respect of the most prominent ophthalmic pathologists of his day. In reviewing the volume dedicated to him in honor of his seventieth birthday, I was pleased to find in it papers by such men as Finnoff, Friedenwald, the Giffords, Goar, DeLong and Verhoeff, all of whom wrote on subjects relating to pathology of the eye. Moreover, Dr. Jackson was always intensely interested in education. He firmly believed that even the greatest of leaders have much to "learn through contact with their inferiors." I trust, therefore, that he would not be displeased that I have selected this subject to kudize him this morning.

I propose, as the principal part of this Jackson Lecture, to review the development of the Registry of Ophthalmic Pathology and to tell you something of our present activities. Then I would like to speculate a bit about the future and to enlist your aid in planning for the future. This Registry belongs to you, and it is, at least in part, your responsibility not only to preserve its heritage but to nurture it in such a way that its usefulness to us and its ultimate value to our patients and for the Nation's health will be enhanced.

THE ARMY MEDICAL MUSEUM

Before turning our attention to the Registry of Ophthalmic Pathology, I would like to review some of the history of the parent organization, the Army Medical Museum (figs. 1-7). The Med-

Chief, Ophthalmic Pathology Branch, and Registrar, Registry of Ophthalmic Pathology, Armed Forces Institute of Pathology, Washington 25, D. C.

Presented at the Sixty-Fifth Annual Session of the American Academy of Ophthalmology and Otolaryngology, Oct. 9-14, 1960, Chicago.

FIG. 1—The first home of the Army Medical Museum, 1862-1863. The Surgeon General's office was also housed in this building. Neg. No. 32779.

ical Museum, approaching its first centennial, was founded on May 21, 1862, by the Surgeon General of the Army, Brig. Gen. William Alexander Hammond. The original purpose of the Museum was to house "all specimens of morbid anatomy, surgical and foreign bodies removed, and such other matters as may prove of interest in the study of Military Medicine or Surgery" obtained from the Civil War Battlegrounds. It is evident, however, that what General Hammond also had in mind was the development of a great graduate school of medicine in Washington, where Medical Officers of the Army would be kept abreast of new advances in Science and Medicine* (Leikind, 1954).

*This was the first organized medical research project for the diligent collection of pathologic specimens that was national in scope. Its objectives were to provide material for the training of Medical Officers, for research in methods to diminish morbidity and mortality of soldiers, and for preparation of the *"Medical and Surgical History of the War of the Rebellion."*

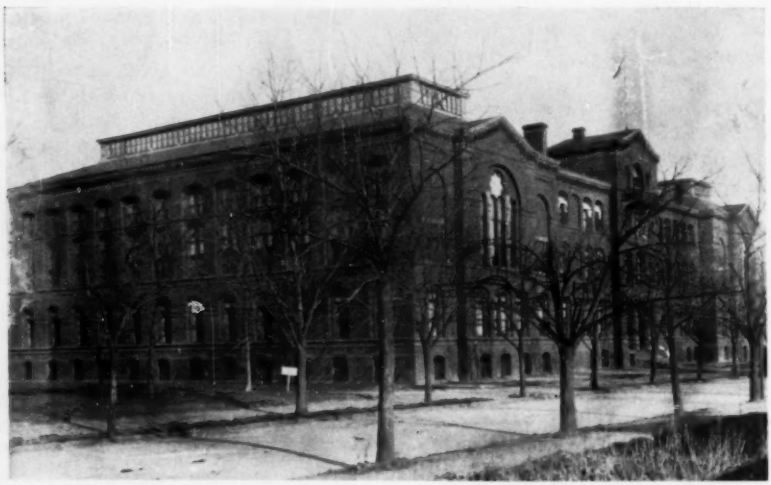

FIG. 2—The Army Medical Museum moved into this building in 1887, sharing the quarters with The Army Medical Library until 1955. This photograph was taken before World War I. Neg. No. 415.

FIG. 3—Main exhibit hall of The Army Medical Museum before World War I. Neg. No. 746.

FIG. 4—Same building shown in figure 2 at Seventh and Independence Avenue, S.W., after World War II, when it became the home of the Armed Forces Institute of Pathology. Neg. No. 219761-2.

FIG. 5—The Medical Museum of the Armed Forces Institute of Pathology presently occupies this building at Ninth and Independence Avenue, S.W. Neg. No. 218702-2.

FIG. 6—One of several exhibit halls in the present Medical Museum of AFIP. Part of the Ball Collection (see figure 20) is on display in one of these cases. Neg. No. 59-4675-6.

During the period 1862 to 1917, the professional staff at the Museum (figs. 8-11) demonstrated an extremely broad range of interests, which included such historically significant developments as Joseph Janvier Woodward's pioneer efforts in microscopy and photomicrography; Walter Reed's, James Carroll's, and Frederick Fuller Russell's investigations of the etiology, epidemiology, and prevention of infectious diseases; Daniel Smith Lamb's extended contributions to pathologic anatomy; and publication of

FIG. 7—Aerial view of new building of Armed Forces Institute of Pathology on grounds of Walter Reed Army Medical Center. Neg. No. 58-2917-26.

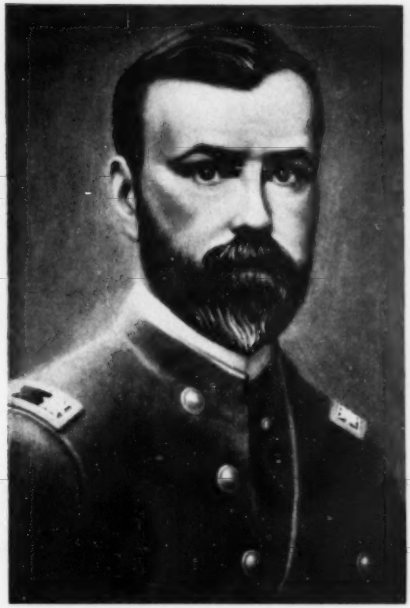

FIG. 8—Army Medical Museum's first Curator, Surgeon John Hill Brinton. Neg. No. 58-7854-14.

FIG. 9—Joseph Janvier Woodward, Assistant Curator and Pathologist at Army Medical Museum from 1862-1881, was a pioneer in histopathologic technique and photomicrography. The photographic plate from which this picture was printed was made about 1880 (Edmonds, 1951). Neg. No. 3659.

FIG. 10—Major Walter Reed, MC, USA, Fifth Curator of the Army Medical Museum, 1893-1902. Neg. No. 2546.

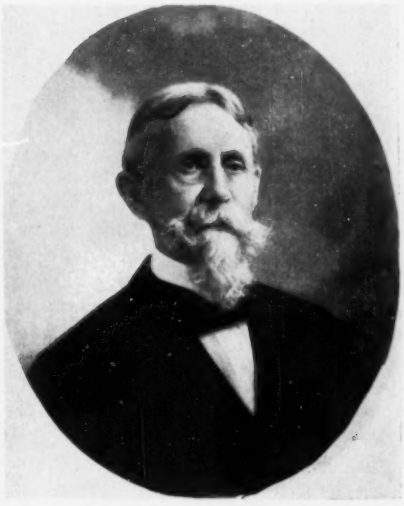

FIG. 11—Dr. Daniel Smith Lamb, pathologist at the Army Medical Museum for more than 50 years, recorded the Museum's history from 1862-1917. He also examined the oldest specimen (fig. 13) in our present Registry of Ophthalmic Pathology. Neg. No. 57-13237.

the remarkably complete and extensively cross-indexed catalogues of the United States Army Medical Museum in 1866 (Surgical Section) and in 1867 (Medical Section).

During those early days, there seems to have been relatively little interest in ophthalmic histology and pathology, though, interestingly enough, we learn from the complaint of a Dr. L. E. Rauterberg addressed to the Senate Committee on Vivisection that the eye was the subject of some experimental work! "I have thus seen animals with eyes, sections of brain and other parts removed and kept in reserve for future experiments for a number of days and all for the verification and repetition of results obtained and published years ago." Fortunately, Major Walter Reed, then Curator of the Museum, was able to obtain testimony to the effect that Rauterberg's assertions of "the most inhuman and barbarous mutilations of the dumb animal under the supervision and with the sanction of the United States Officers in Charge" were wonderfully distorted, inaccurate and false and that all animals experimented upon were under the influence of an anesthetic.

In the report of the Surgeon General for the fiscal year 1888-1889, there is a statement that 73 specimens of eyes showing disease or injury had been contributed by Dr. H. G. Noyes of New York City. Unfortunately, Dr. D. S. Lamb, Pathologist of the Museum, was unable to locate any record of this contribution; he concluded that if Dr. Noyes' specimens were actually received, some disposition must have been made of them, of which no record is found. Lamb did acknowledge a contribution of 26 ophthalmic specimens from Dr. S. M. Burnett of Washington in June 1889. The fate of these is also uncertain, for they are not in our present Registry of Ophthalmic Pathology, which includes only those specimens received during and since 1917.

While we are justly proud of the fact that the Registry of Ophthalmic Pathology is generally acknowledged as being the first of the Registries* established at the Army Medical Museum, we must recognize the fact that other specialty groups took active interest in the possibility of utilizing the Museum's facilities for specimen preparation, teaching and research long before the American Academy of Ophthalmology and Otolaryngology. Thus, we find in Dr. Lamb's history of the U. S. Army Medical Museum the following interesting quotation contained in a letter that Deputy Surgeon General John Shaw Billings, then the Director of the Museum and Librarian of the Surgeon General's Office, wrote to Dr. William Donally, a Washington dentist, on December 10, 1894:†

> I have attempted in past years to call the attention of the dental profession to this institution (that is, the Army Medical Museum) as one which they should endeavor to make complete in all matters relating to the Pathology and treatment and diseases of the teeth and jaws so that it might be considered by them as their national collection of literature, specimens, apparatus, etc. to illustrate the history and condition of dentistry, just as other sections of the Museum and Library are considered to be their national collection by the physicians, surgeons, and specialists of the country; and it appears to me that more definite, useful and permanent results can thus be obtained than are likely to follow from an attempt to create a new Museum and Library devoted exclusively to matters of interest to the dental profession.

On September 16, 1895, Dr. Donally was one of a committee of the American Dental Association appointed to add to

*There are now 25 Registries in the American Registry of Pathology (table I).

†See also Walton, J. R. (1895).

TABLE I

REGISTRIES OF THE AMERICAN REGISTRY OF PATHOLOGY*

REGISTRY	SPONSORING SOCIETY	DATE	REGISTRARS†
1. Ophthalmic Pathology	Am. Acad. of Ophthalmology and Otolaryngology	1921	L. E. Zimmerman, M.D.
2. Lymphatic Tumor	Am. Assn. of Pathologists and Bacteriologists	1925	R. J. Lukes, M.D.
3. Bladder Tumor	Am. Urological Association	1927	F. K. Mostofi, M.D.
4. Dental and Oral Pathology	Am. Dental Association	1933	L. S. Hansen, Capt., MC, USN
5. Otolaryngic Pathology	Am. Acad. of Ophthalmology and Otolaryngology	1935	S. H. Rosen, M.D.
6. Dermal Pathology	Am. Acad. of Dermatology and Syphilology	1937	E. B. Helwig, M.D.
7. Kidney Tumor	Am. Urological Association	1938	F. K. Mostofi, M.D.
8. Chest Tumor	Am. Assn. for Thoracic Surgery	1940	S. H. Rosen, M.D.
9. Neuropathology	Am. Assn. of Neuropathology-Am. Psychiatric Association	1942	W. E. Haymaker, M.D.
10. Orthopedic Pathology	Am. Soc. of Clinical Pathologists	1943	L. C. Johnson, M.D.
11. Prostatic Tumor	Am. Urological Association	1943	F. K. Mostofi, M.D.
12. Veterinary Pathology	Am. Vet. Medical Association	1944	F. D. Mauer, Lt. Col., V.C., USA
13. Gerontology	Gerontological Society	1945	G. H. Klinck, M.D.
14. Genito-Urinary Pathology	Am. Urological Association	1947	F. K. Mostofi, M.D.
15. Radiologic Pathology	Am. Coll. of Radiology-Am. Roentgen Ray Soc. Radiologic Soc. of North Amer.	1947	W. L. Thompson, Col., MC, USA Ret.
16. Cardiovascular Pathology	Am. Heart Association	1948	W. C. Manion, M.D.
17. Endocrine Pathology	None	1948	G. H. Klinck, M.D.
18. Hepatic Pathology	Am. Gastroenterologic Society	1949	H. F. Smetana, M.D.
19. Leprosy	Leonard Wood Memorial	1950	C. H. Binford, M.D.
20. Nutritional Pathology	Am. Institute of Nutrition	1951	R. H. Follis, M.D.
21. Female Reproductive System	Am. Soc. of Clinical Pathologists	1952	R. D. Neubecker, M.D.
22. Gastro-intestinal Tract	Am. Soc. of Clinical Pathologists	1952	E. B. Helwig, M.D.
23. Pediatric Pathology	Am. Acad. of Pediatrics	1956	H. F. Smetana, M.D.
24. Forensic Pathology	Coll. of American Pathology	1958	E. H. Johnston, Maj., MC, USA
25. Testicular Tumor	Am. Urological Association	1959	F. K. Mostofi, M.D.

*Colonel J. M. Blumberg, MC, USA, is Scientific Director, American Registry of Pathology
†September 1960

the dental exhibit in the Museum. As a result of the efforts of this committee, the dental collection was much enlarged. The American Dental Association at its thirty-sixth annual meeting, adopted a resolution formally recognizing the Museum and the Library as the National Library and Museum of the Dental Profession in the United States.

In his presidential address to the Washington Obstetrical and Gynecological Society on October 6, 1899, Dr. Thomas C. Smith chose to speak on the obstetrical and gynecological treasures available at the Army Medical Museum. He called the attention of his colleagues to the advisability of more frequently resorting to this storehouse of pathology and of considering the advantages to be derived from frequent visits to the Museum when they were preparing papers for oral presentation or for publication. In closing his address, Smith reminded his audience that it was their duty to add

to the Museum's collections in every possible way and exhorted them not only to contribute specimens but to provide salient histories and results of such laboratory examinations as might have been made. Thus the value of Museum specimens would be enhanced, further investigation would be greatly facilitated, and the additional labor required of the contributor would be minimal. Amen!

In 1917, all pathologic specimens and other important acquisitions in the Museum were assigned consecutive accession numbers which are still in use today (fig. 12). While at first, the same series of accession numbers was used for such nonpathologic acquisitions in the Museum as wax models, old instruments, and photographs, it subsequently became the policy to reserve these accession numbers for individual case studies. Only one accession number is assigned to any one individual.* Thus in the course of a lifetime, many biopsies and finally the autopsy of an individual will be filed under the same accession number.

It is of historical interest that the first new surgical pathology case contributed to the Museum in 1917 when the current series of "Accession Numbers" was begun was number "6." The first three acquisitions were temporal bones mounted for Museum display, purchased from the late Edgar B. Burchell of New York City. A series of photographs was assigned Acc. No. 4. The first autopsy case was that of an anencephalic fetus (Acc. No. 5). AFIP Acc. No. 6 is of special interest to us because it concerned a 3-year-old colored girl whose eye was enucleated at the Children's Hospital in

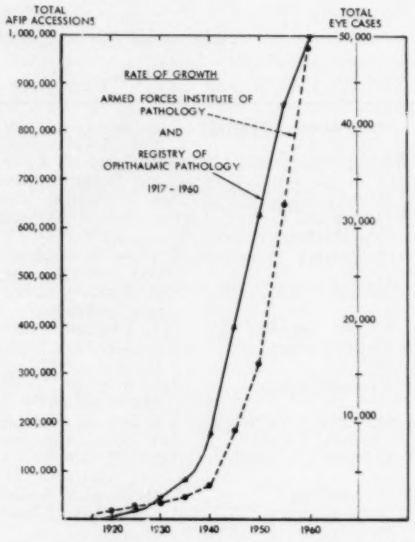

FIG. 12—Comparison of the period of accelerated growth of the Registry of Ophthalmic Pathology with that of the entire AFIP reveals the former began about five years before the latter. Neg. No. 60-5610.

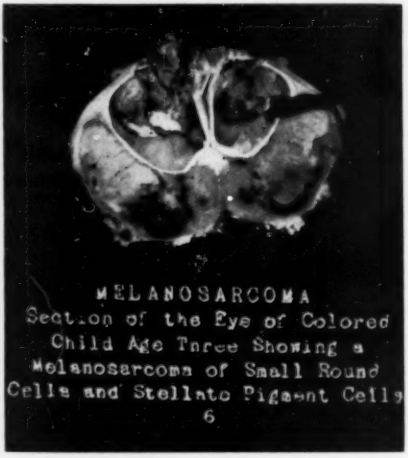
MELANOSARCOMA
Section of the Eye of Colored Child Age Three Showing a Melanosarcoma of Small Round Cells and Stellate Pigment Cells
6

FIG. 13—This retinoblastoma, erroneously labeled a melanosarcoma when it was accessioned in 1917, represents the first surgical specimen contributed when the present series of Accession Numbers was begun in that year. AFIP Acc. No. 6.

*By the end of the present calendar year the total number of accessioned cases on file at the AFIP will be approximately 990,000. Of these, about 50,000 are in the Registry of Ophthalmic Pathology, which includes 7,700 tumors, 4,600 cases of primary and secondary glaucoma, 11,700 eyes enucleated because of trauma, 900 congenital malformations, and 3,800 inflammatory lesions.

FIG. 14—Dr. Harry Gradle, to whom major credit is due for having conceived of a central laboratory and museum of ophthalmic pathology to be used for postgraduate teaching. Neg. No. 60-5251.

FIG. 15—Brig. General George Russell Callender, MC, USA, Retired, who as a Major serving as Curator of the Army Medical Museum was responsible for the organization of an ophthalmic pathology laboratory and museum at the Army Medical Museum and for the subsequent American Registry of Pathology.

FIG. 16—Photograph of the original letter distributed before the 1921 Academy Meeting advising the membership of the plans to establish a central museum of ophthalmic and otolaryngologic pathology at the Army Medical Museum.

TWENTY-SIXTH ANNUAL MEETING, PHILADELPHIA, PA., OCTOBER 17-22, 1921

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My Dear Doctor:

At the June, 1921, meeting of the Council of the American Academy of Ophthalmology and Oto-Laryngology, it was decided to establish a Museum of Ophthalmic and Oto-Laryngologic Pathology. Is is obvious that a Society without permanent headquarters and without a staff of trained technicians could not make a success of such a project alone, since it would require a permanent location, a corps of trained technicians, a comprehensive method of filing and cataloguing specimens, and all of the other necessities of a museum. The Society, however, is in a position to supply abundant pathological material. A representative of the Council had approached the Surgeon General of the Army previous to this meeting and was offered the facilities of the Army Medical Museum for the establishment of such a collection as would be of most interest and value to Ophthalmologists and Oto-Laryngologists. The Army Medical Museum receives specimens of all varieties and has a large collection of Ophthalmic instruments, but only a very small collection illustrating Ophthalmic or Oto-Laryngologic Pathology. This institution has agreed to set apart certain space for the display of Ophthalmic and Oto-Laryngologic Pathology and to co-operate further by sending reports to donors of specimens, together with such photographs as it is found possible to take, both of the gross specimens and of any microscopical slides made therefrom. There is, however, no person at the Museum well qualified in Ophthalmic or Oto-Laryngologic Pathology. It is therefore considered necessary that all Ophthalmic and Oto-Laryngologic Pathologists who may be willing to assist in making diagnoses of the specimens prepared by the Museum be placed on a voluntary committee and asked to pass upon specimens which will be sent them for confirmatory diagnosis from the Army Medical Museum.

The following working plan is suggested in the hope that free and constructive criticism will be offered to the undersigned committee before final hard and fast rules are adopted:

(1) **The name of this section of activities of the American Academy of Ophthalmology and Oto-Laryngology shall be "The Section of Pathology."**

(2) The Museum collection shall be located in the Army Medical Museum at Washington, D. C.

(3) The administration shall be conducted by the Curator, Army Medical Museum, in consultation with a supervisory committee of the Academy. Any administrative matters involving the Army Medical Museum will require the approval of the Surgeon General, U. S. Army, as represented by the Curator, Army Medical Museum.

(4) All members of the American Academy of Ophthalmology and Oto-Laryngology are urged to send interesting specimens of Ophthalmic or Oto-Laryngologic Pathology to the Museum, together with as complete a protocol as possible, and to co-operate in every way to make the institution a success.

(5) The Army Medical Museum shall not be financially obligated. In case the amount of incoming material becomes so large as to require extra technical or clerical help, special arrangements therefor will be considered by the Academy. The minor expenses of printing, etc., amounting to not more than $100 per year, shall be borne by the American Academy of Ophthalmology and Oto-Laryngology.

The Surgeon General of the Army has signified his willingness to prepare a suitable collection of such material as may be available for exhibition at the annual meetings of the American Academy of Ophthalmology and Oto-Laryngology, the expenses of transportation and display to be borne by the American Academy of Ophthalmology and Oto-Laryngology.

Under the regulations of the Army Medical Museum the Pathological material is open for study to any qualified person, as may be determined by the Curator, and facilities are offered there for such study; a suitable laboratory and microscopes, together with access to the complete records of all specimens, are available during the hours the Museum is open.

Specimens sent in should be addressed as follows:

ARMY MEDICAL MUSEUM,
WASHINGTON, D. C.
Section of Ophthalmic (or Oto-Laryngologic) Pathology.

and should have the donor's name and address. A complete protocol of the case must be sent under separate cover, so labeled as to avoid confusion. Specimens for microscopic study should be placed in 10% formalin or Zenker's fluid as soon after removal as possible. After 24 hours, wash the specimen, change the fluid, and send it to the Museum in a tightly stoppered bottle within a stout carton.

MAJOR G. E. CALLENDER, M. C.,
Army Medical Museum,
Washington, D.

DR. H. S. GRADLE,
22 E. Washington Street,
Chicago, Ill.

DR. IRA FRANK,
104 S. Michigan Avenue,
Chicago, Ill.

Washington and contributed to the Museum by Dr. D. K. Shute on April 27, 1917. The specimen was examined by Dr. D. S. Lamb, who found an intraocular neoplasm which he misinterpreted as a "round cell melanotic sarcoma." The specimen was prepared for the Museum (fig. 13) and has been displayed under that erroneous diagnosis all these years! The tumor is actually a necrotic retinoblastoma that has invaded the choroid and extended posteriorly into the optic nerve and orbit.

Between 1917 and the beginning of 1922, only an occasional eye was submitted to the Museum for pathologic study. During this period, the total accessions rose to about 18,000, a large proportion of which represented postmortem cases from the awful influenza epidemic of 1917-1918. Among these 18,000 cases, only 18 eyes were included. This is fewer than we now receive in one average week. It is obvious, therefore, that pathologists at the Museum were not in a position to become expert in the field of ophthalmic pathology.

THE ACADEMY AND THE MUSEUM

It has been impossible for me to obtain a completely clear picture of how the American Academy of Ophthalmology and Otolaryngology and the Army Medical Museum first came together, because the initial correspondence between officers of these two organizations has not been located either in Dr. Benedict's office at the Academy or in the Armed Forces Institute of Pathology. It is amply clear, however, that Dr. Harry Gradle (fig. 14), representing the American Academy of Ophthalmology and Otolaryngology, and Major George R. Callender (fig. 15), then the Curator of the Army Medical Museum, were the principal persons concerned with the organizational aspects of what we now call the Registry of Ophthalmic Pathology. In the minutes of the 1921 meeting of the Academy, Dr. Gradle made reference to a printed letter that was distributed to the membership of the Academy prior to the annual meeting. This letter, which is reproduced in figure 16, describes action taken by the Council of the Academy to establish at the Army Medical Museum, a Section and Museum of Ophthalmic and Oto-Laryngologic Pathology. As Dr. Gradle pointed out, the Academy membership was in a position to contribute material which was lacking at the Museum and, on the other hand, the Army could supply the home for the Museum and the technicians necessary to prepare the specimens. Dr. Gradle's report recapitulating the union which had been effected between the Academy and the Museum was moved for acceptance by Dr. Nelson Black of Milwaukee. The motion was seconded and carried. Thus we have, in 1921, the beginnings of the present Registry of Ophthalmic Pathology.

But since neither trained technicians nor pathologists experienced in ophthalmic and otolaryngic pathology were available for this specialized work, a special committee would need to be developed to provide guidance. It was only natural that Gradle and Callender should turn to Dr. Frederick H. Verhoeff (fig. 17) of Boston for guidance. At about the time of the International Congress of Ophthalmology held in Washington, D. C., May 1922, Verhoeff was called to the Museum to discuss the matter with them, at which time he suggested the formation of a Registry of Ophthalmic Pathology.* Verhoeff was asked to give the technicians of the Museum in-

*At this time the first of all national registries—the Codman Bone Sarcoma Registry—was less than two years old. Codman was then a friend and patient of Verhoeff's, and he often discussed with him his Bone Tumor Registry. Verhoeff probably obtained the term "Registry" from Codman (personal communication from Verhoeff).

FIG. 17—Dr. Frederick Herman Verhoeff was the Army Medical Museum's principal consultant in ophthalmic pathology during the first two decades of the Registry's existence.

structions as to the sectioning of eyes, which he did.

Some of Dr. Harry Gradle's remarkably farsighted thoughts, which coincided so well with those of Major Callender, Curator of the Museum, and General Ireland, Surgeon General of the Army, and which played such a major role in establishing the Registry of Ophthalmic Pathology, are contained in a lengthy letter which he wrote to Dr. Walter R. Parker, who was then President of the American Academy of Ophthalmology and Otolaryngology. This letter dated August 26, 1922, was written only ten months after the Section and Museum of Ophthalmic Pathology were established at the Army Medical Museum. The letter read as follows:

My Dear Doctor Parker,

I believe that you are correct in recommending that only members of the Academy be intimately associated with the work of the Section on Pathology. However, it seems to me that the section has proven its value sufficiently in the short time that it had been in existence to justify an expansion that was in my mind when I first suggested the idea of the Section. An expansion that was necessarily dependent upon a small beginning and a cautious feeling of the way.

In order to show what has been accomplished and thus to lead to the bigger idea, allow me to recapitulate briefly. The Section on Pathology has been existent since last October. In that time we have received over 100 ophthalmic specimens and two oto-laryngologic. These have been worked through as rapidly as has been possible and consistent with good work and every one has been examined and diagnosed personally by Dr. Verhoeff (from now on, four of us are going to do the preliminary examining and then send the specimens to Verhoeff for final judgement). Every specimen is photographed in the gross and then worked-up in toto histologically. From this fairly large material, the Museum is preparing an exhibit for the Minneapolis Meeting that we hope will be creditable. But the material is not coming in the way it should. We do not expect material from you or Knapp or Verhoeff or the men with laboratories at their disposal. It should come from men in cities, not associated with an Institution that does ophthalmic pathology, and from the men in the smaller localities. To reach these men and impress upon them the value of sending in *all* of their material is the biggest task of the Section today, and mind you, all of this has been done without a cent of expense to the Academy or to any individual.

In order to increase the scope of the work and make the Museum the real center of Ophthalmic Pathology, it is necessary to enlist a larger number of men as donors and to interest the teachers and leaders of the profession in encouraging such donations (at St. Louis, Dr. DeSchweinitz persuaded Dr. J. M. Ball to donate his entire pathological collection to the Museum). Further, oto-laryngologic pathology must be divorced from the ophthalmic and must be treated separately. To this end, I would like to propose to you the following scheme and, if it meets with your approval, then incorporate it in my report to the Academy on the activities of the Section on Pathology.

Let the Section on Pathology expand to a national body in the same way that the Board of Ophthalmic Examinations is national. Let it be under a committee of three, one appointed from each of the three national Ophthalmic Societies and each member to serve for

three years. Each year, one member shall be retired automatically (after the end of the first three years) and his place shall be filled by a member appointed by the Society of which the retiring member was the representative. This committee shall have a fourth member who shall be the Curator of the Army Medical Museum. The committee shall have the power to act without referring to the parent body unless such action may be opposed to the policies of the parent societies. The expenses of the committee (purely nominal) shall be borne by the parent Societies, prorated according to the membership of the Society of the current year. Let the name of the loose organization be the American Museum of Ophthalmic Pathology (or what have you?) and the purpose, to found a central museum of ophthalmic pathology at the Army Medical Museum, utilizing for that purpose such pathological resources of the country as may be available. With such a formation established, several things could be accomplished. First, greater efforts could be made at obtaining material, as all local feeling would be eliminated and all of the members of all the national Societies would cooperate. Moreover, the aid of the 25 odd local Societies could be enlisted in securing material. Second, an exchange of unusual material could be arranged with the universities and Institutions doing ophthalmic pathology, to the greater advantage of all concerned. Third, all this would tend to stimulate a nationwide interest in the subject that has been sidetracked for the fascinating hunt of the dollar, namely ophthalmic pathology.

Now I come to some of the ideas that I am not willing to voice to anyone but you. After a few years, when sufficient material has been collected, it will be possible to assemble some three to eight of our nationally recognized ophthalmic pathologists in Washington or someplace else and give a 2 to 4 weeks course in ophthalmic pathology to such ophthalmologists as may desire it. Irrespective of what the price of such a course might be, there would be enough microscopes to go around. The attendance at the Fuchs lectures in Chicago, proved that. It will also be possible to make up study sets of 200 or more sections representing different phases of ophthalmic pathology, accompanied by complete descriptions, that could be sent around the country to places remote from institutions as loans for home study. I have two such sets out now and they are in constant demand. There are also a few other ideas that could be worked out, dependent upon the expansion of the Section on Pathology.

I am sorry to inflict this long a letter upon you, but I do not want to move in this matter without your advice. May I have that before the meeting in order that I can prepare the necessary report? We are running a special train out of here on Sunday nite, September 17, on the C. M. & St. P. I hope that you can join us on that as we expect a good crowd.

Cordially,
/s/ Gradle

Gradle, Verhoeff, and Callender then organized a panel of consultants to whom the Museum could refer difficult cases for descriptions and diagnoses. The panel included, in addition to Dr. Verhoeff, the chairman, the following men: Drs. Harry S. Gradle (Chicago), M. Feingold (New Orleans), William C. Finnoff (Denver), W. E. Camp (Minneapolis), and H. Barkan (San Francisco) (see Coupal, J. F., 1923).

As is so often the case with committees, there are always individuals who are eager to be on the committee but who fail to render service. The committee on Ophthalmic Pathology was no exception, as we learn in an interesting letter which Callender wrote to Gradle on February 27, 1926. Among other things, Callender stated:

I do not approve of adding any other person to this committee unless they are going to be active as a consultant pathologist. At the present time, I personally am reporting on a considerable number of specimens which are not difficult, sending only the difficult cases to Dr. Verhoeff. The result is we are up to date. Dr. ——— never reported on some of the cases he had and I never received replies from Dr. ———. Needless to say I am too busy to deal with people under these conditions and, therefore, I took up the work of handling the easiest specimens myself. I think it rather unfair that Dr. Verhoeff should do it all but that is the status and he is always extremely prompt in returning replies.

Subsequently a more satisfactory Advisory Committee of ophthalmologists who were exceedingly interested in the Registry of Ophthalmic Pathology and who rendered faithful service for many years was established. In addition to

FIG. 18—Dr. Jonas Stein Friedenwald succeeded Verhoeff in the role of principal consultant to the Registry of Ophthalmic Pathology.

Doctors Gradle and Verhoeff, the committee included Dr. Jonas S. Friedenwald (of Baltimore) (fig. 18) and Dr. Georgiana D. Theobald (of Chicago) (fig. 19) (Cornell, 1936).

It was very fortunate for Dr. Harry Gradle and the American Academy of Ophthalmology and Otolaryngology that the pathologist who was Curator of the Army Medical Museum in 1921, Major George R. Callender, and the person who was then Surgeon General of the Army, Major General M. W. Ireland, were both anxious to alter the course of the Army Medical Museum. As Callender stated when he participated in the 1953 program of the Academy, the Army Medical Museum was rejuvenated by receiving an enormous amount of material from World War I. The staff of 1920 decided the Institution should become a live activity in pathology in addition to its function of collecting, studying, and reporting on the injuries and diseases of armed conflicts. Major General M. W. Ireland ably supported the decision and enabled the Museum to become an Institute of Pathology rather than a "pickle factory," as he had facetiously called it.

During the transition period which followed World War I, a follow-up program was established for tumors and for determining the residual pathology of diseases of military importance. It was at this time, when the Registry type of approach had already begun to be applied to cases on file at the Museum, that Dr. Harry Gradle approached Major Callender with his proposal to establish a central laboratory of Ophthalmic and Otolaryngic Pathology.

The appreciation of the officers of the Academy for the active participation of the Army Medical Museum in the first annual meeting of the Academy following the establishment of the Section and Museum on Ophthalmic Pathology was expressed in letters to the Surgeon General of the U. S. Army. On September 25, 1922, Gradle wrote:

> At the annual meeting of the American Academy of Ophthalmology and Otolaryngology that was just held in Minneapolis, the Army Medical Museum exhibited specimens of ophthalmic pathology, both gross photographs as well as microscopic slides. These specimens have been collected during the past year from the members of the Academy. The exhibit was largely attended and received great praise. It was one of the best public exhibitions that it has ever been my good fortune to see, an opinion that was concurred in by all of the pathologists at the meeting. I wish to take this opportunity of expressing to the Army Medical Museum through your office, the appreciation of the character of the work that has been done for the past year.
>
> In view of the fact that this loosely bound union between the Army Medical Museum and the Section on Pathology of the American Academy of Ophthalmology and Otolaryngology has proved so successful, it seems ad-

FIG. 19—Dr. Georgiana Dvorak-Theobald faithfully served with Verhoeff and Friedenwald on the ophthalmic pathology advisory committee and was an important contributor to the Registry during its early days of rapid growth.

visable to endeavor to expand the field of activity. During the past year, about 100 ophthalmic specimens have been sent to the Museum. There should have been 5 to 10 times that number and even that would represent but a small amount of the ophthalmic pathological material that is wasted annually. By interesting a large number of men in the project, it would seem probable that a larger amount of material could be secured. In order to do this, I would suggest that the American Ophthalmological Society and the Ophthalmic Section of the American Medical Association, the other two National Ophthalmic Societies, be approached with the aim of securing their cooperation. The Academy has authorized me to make such advances, pending your approval. Should you approve of the suggested expansion, it probably would be better to handle the matter through the Academy. There is much to be gained by such cooperation. With the increased number of specimens that could be secured by proper publicity, through the three Societies, it would not be long before the Army Medical Museum would house the finest collection of Ophthalmic Pathology of any Institution. Such a collection would increase rapidly by arranging exchanges with other Institutions doing similar work and eventually would offer the greatest teaching possibilities that exist. In fact, the possibilities are nearly unlimited and if the standards, set by the work of this past year, are maintained (as I am sure they will be), there will be established a Mecca for ophthalmic patholo-

gists. May I hear from you on this subject?

Again I wish to express the appreciation of the Academy of the work and of the exhibit of the Army Medical Museum, Section on Ophthalmic Pathology, and I shall take the opportunity of expressing that appreciation in person on my visit to Washington during the next month.

Very truly yours,
/s/ Gradle

On October 7, 1922, Dr. Walter R. Parker wrote to General Ireland as follows:

I have just finished my term as President of the American Academy of Ophthalmology and Otolaryngology, and wish to express to you my great appreciation of the generous arrangement you have made with the Academy for their pathological work. The exhibition in Minneapolis was a great credit to all of us, and I believe that this opportunity to make these specimens available for study will be productive of great results.

Dr. Gradle and his committee have been very active, and are as enthusiastic over the arrangements made with the Army Medical Museum as I am. Thank you many times.

With kindest personal regards.

Very sincerely yours,
/s/ Walter R. Parker

In the minutes of the 1923 meeting, Gradle reported that the committee on pathology had been working in a rather loose manner and unfortunately for some, "the greatest endeavor has been along the line of ophthalmic pathology, so that oto-laryngology has been treated in a rather stepmotherly fashion." He recommended that the Section on Pathology be divided into two separate committees, Ophthalmic Pathology and Otolaryngic Pathology, since these represent so radically different fields that no one committee would be able to handle them properly. Gradle pointed out that the Section on Ophthalmic Pathology had endeavored to become nationalized in that the Academy had joined with the American Ophthalmological Society and the Section on Ophthalmology of the American Medical Association in endeavoring to establish a "National Museum of Ophthalmic Pathology" with headquarters at the Army Medical Museum. The plan which was approved at the 1921 meeting and which had been put into effect during 1922 was as follows: Ophthalmologists were requested to send in all of their specimens, not only those that were rare or unusual, for, in order to have a complete collection, everything was deemed necessary. The specimens were processed at the Army Medical Museum by the technical and professional staff on duty there and a final report and diagnosis was given to the donor. At the request of the donor, photographs, as well as slides, were furnished. In this way, it was planned to gradually build up a Museum of Pathology where every specimen would be available to every member of the Academy. It was hoped that eventually the collection could be made available "to every reputable physician, both in Washington and outside as the material could be sent by mail."

The Museum of Ophthalmic Pathology almost immediately got off to a good start when Dr. James Moores Ball of St. Louis contributed his entire ophthalmic museum and pathology collection to the Army Medical Museum on July 4, 1922 (fig. 20) (Coupal, J. F., 1923). Thereafter, things progressed more slowly and we find Dr. Gradle in his 1924 report complaining that there had not been the response from the membership of the Academy and the profession at large which had been anticipated. By 1927, however, Gradle was becoming more optimistic and he reported that the Committee on Ophthalmic Pathology, working in conjunction with the Academy was continuing the growth of its work. Ophthalmic specimens were being sent in to the Army Medical Museum in greater numbers and there were then about 2000 specimens contributed mainly by members of the Academy. This

ST. LOUIS POST-DISPATCH

ST. LOUIS, FRIDAY, MARCH 1, 1929.

DR. J. M. BALL, NOTED OCULIST AND WRITER, DIES

His Work on "Modern Ophthalmology One of Foremost Studies of Eye Diseases Used Today.

Funeral Services Monday.

By his own wish, Dr. Ball's body will be cremated and the ashes placed in the Army Medical Museum in Washington, to which in 1922 he donated his collection of anatomical specimens and drawings, charts and casts. The collection, made over a period of 20 years, is said to be second only to that of Dr. George E. de Schweinitz of Philadelphia.

Funeral services will be held at the family residence Monday.

Besides his work on ophthalmology, Dr. Ball wrote two other volumes, "Andreas Vesalius, Reformer of Anatomy," issued in 1910, and "The Sack-'Em-Up Men," an account of the days when' graveyards were looted for human dissection specimens. The latter book was issued last year.

FIG. 20—(Top) Urn containing the ashes of Dr. James Moores Ball, who helped establish the central Museum of Ophthalmic Pathology by contributing his large collection of mounted specimens in 1922. Neg. No. 60-5500. (Bottom) Portion of Dr. Ball's obituary in St. Louis Post-Dispatch. Neg. No. 60-5501.

increased growth, however, presented a new problem, for the limited facilities and personnel afforded the Museum by Congress was not adequate to keep pace. Gradle stated:

As a result it becomes absolutely essential that help from this Society be now forthcoming. Why is this help necessary? Because the Museum is just beginning to be in a position to accomplish what they wish to do. One of the great aims of the Museum is not only to be a true pathologic Museum but also to put out study sets. Sets of 50 or 100 slides representing various conditions of ophthalmic pathology, these sets to be loaned to members of the Academy at no cost beyond transportation, for a period not to exceed 3 months. Each slide is accompanied by a complete description and a man desiring to improve his knowledge of pathology can borrow one of these sets from the Museum and, in addition, receive any other information the Museum has, on request.

In a letter dated March 7, 1926, Gradle wrote to Dr. E. C. Ellett who was then President of the American Academy of Ophthalmology and Otolaryngology, strongly recommending that the ophthalmic pathology work being conducted at the Army Medical Museum be subsidized by the various sponsoring societies. He suggested that the Academy appropriate $1100 a year, the American Ophthalmologic Society $300 a year, and the Section on Ophthalmology of the American Medical Association $100 a year. However, in his official report to the Academy, Gradle suggested that since the Academy's Section on Instruction was expected to show a profit of $1000 for the year, that $500 of this could well be given to the Army Medical Museum. Thus began an annual appropriation of $500 per year, which continued for several years, mainly to subsidize the preparation of loan sets.

With respect to the annual contribution of $500 which the Academy was making in those days, it is interesting to note that Dr. Gradle began his report at the 1934 meeting as follows:

Mr. Chairman and Members: I should like to tell you what you are getting for your $500. In the first place the Academy is no longer bearing the entire brunt of the work on ophthalmic pathology. By changing the name very slightly we have been able to enlist the aid of the National Research Council, so now we are known as the Division of Ophthalmic Pathology of the American Registry of Pathology.

The first description of the then newly organized American Registry of Pathology to appear in the TRANSACTIONS of the American Academy of Ophthalmology and Otolaryngology was contained in Callender's 1930 report, by which time there were, in addition to the Ophthalmic Pathology Registry sponsored by the Academy, the Lymphatic Tumor Registry sponsored by the American Association of Pathologists and Bacteriologists in 1925, and the Bladder Tumor Registry sponsored by the American Urological Association in 1927. In order that adequate support might be obtained and a continuous policy be carried out, Dr. Ludwig Hektoen, Chairman of the Division of Medical Sciences of the National Research Council, appointed a Committee for the American Registry of Pathology which was approved by the National Research Council on June 12, 1930. It was composed of the following distinguished persons: Dr. Howard T. Karsner, Chairman, Dr. Bowman C. Crowell, Dr. James Ewing, Dr. Harry S. Gradle, Dr. Herman L. Kretschmer, Dr. Stanley P. Reimann, and Dr. George R. Callender, Secretary. Callender appended to his report a detailed outline of the object and scope of the American Registry of Pathology. The Registry plan was approved by the American Association of Pathologists and Bacteriologists and by the American Academy of Ophthalmology and Otolaryngology at their respective meetings in 1930.

At this point, it is well for us to recall that while we, today, take for granted our registries as an essential part of modern medicine, back in 1922, when the Academy and the Museum first established the collaborative effort which we now call the Registry of Ophthalmic Pathology, the Registry concept was brand new. The first of all the national registries, the Bone Sarcoma Registry, is only slightly older than ours. The Bone Sarcoma Registry was started by Dr. E. A. Codman for and by the family of a patient whom he had under his care for a supposed bone sarcoma (fig. 21). Codman and the patient's family wished to ascertain the actual facts as to whether there were any living patients who were cured of this disease, and if there actually were, to ascertain the methods of treatment by which these patients had been saved. The family gave one thousand dollars to pay expenses in obtaining the required facts. Codman solicited the advice of Ewing and Bloodgood and established a collection of cases. Through the kindness of personal friends in several clinics, Codman began follow-up investigation. The monetary gift stimulated Codman and many others to work even more vigorously and soon led the Regents of the American College of Surgeons to add an aggregate of $8000 more, contributed from time to time, in order to answer these two simple questions. (See Codman references.)

It soon appeared that by-products were to be the result of this work rather than the intended products of obtaining the answers to the original two questions. The Registry itself was a by-product, for when the original collection of cases could no longer be of possible benefit to the original patient (who by that time had died), the Regents saw that the same questions would be eternal. The friends of future patients would always want to know of the living patients and how they were cured. It is interesting to note that Codman lists among the many by-products of the Registry of Bone Sarcomas during its first five years of existence, "the founding of other registries." I feel certain that Codman must have had the Registry of Ophthalmic Pathology at the Army

REGISTER

NAME	ADDRESS	INTRODUCED BY

The Registry of Bone Sarcoma.

The primary object of this Registry is to keep an up to date list of all cases of living suspected-to-be-bone sarcoma cases. We register every case:

(1.) of which we have a brief history and an X-Ray picture or a slide of tissue.

(2) certain interesting or unusual bone tumor cases which have been confused with sarcoma.

Up to January first 1922 the expenses of the work were paid by the friends of a patient whom it was supposed probably had a sarcoma of the ilium. Autopsy eventually showed that the disease was metastatic cancer. However the material collected for the object of advising treatment in the case of this patient seemed too valuable to lose, and it was realized that it formed a nucleus for a valuable study of this disease, which might be of benefit to future patients. Accordingly the Registry was informally organized by Dr J. C. Bloodgood of Baltimore, Dr James Ewing of New York and Dr E. A. Codman of Boston. At the suggestion of some of the surgeons who had become interested in the work the American College of Surgeons has taken the Registry over as a part of its work and will hereafter pay the incidental expenses necessary.

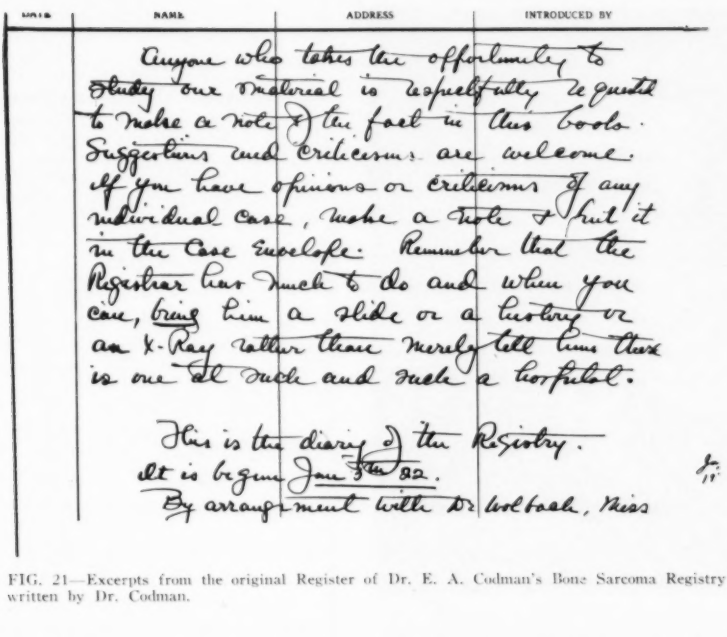
NAME
ADDRESS
INTRODUCED BY
Anyone who takes the opportunity to study our material is respectfully requested to make a note of the fact in this book. Suggestions and Criticisms are welcome. If you have opinions or criticisms of any individual case, make a note & put it in the case envelope. Remember that the Registrar has much to do and when you can, bring him a slide or a history or an X-Ray rather than merely tell him there is one at such and such a hospital.
This is the diary of the Registry.
It is begun Jan 5th 22.
By arrangement with Dr Wolbach, Miss

FIG. 21—Excerpts from the original Register of Dr. E. A. Codman's Bone Sarcoma Registry written by Dr. Codman.

Medical Museum in mind when this was published in 1926.

The registration date of the first cases placed in the Bone Sarcoma Registry, is July 17, 1920. It was less than one year later that the representatives of the American Academy of Ophthalmology and Otolaryngology and of the Army Medical Museum met to make plans for a central laboratory for ophthalmic pathology at the Army Medical Museum.

During the first decade of its existence, the Registry of Ophthalmic Pathology already began to demonstrate its potential along the three main functional lines which characterize the entire program of the Armed Forces Institute of Pathology today, namely, consultative service, education, and research. Diagnostic service was most important during the early days because at that time there were only three or four American laboratories for ophthalmic pathology in active operation, and the total number of specimens examined each year was about 300 (Friedenwald, 1949). When the American Ophthalmological Society and the Section on Ophthalmology of the American Medical Association joined the Academy in promoting the ophthalmic pathology laboratory at the Army Medical Museum in 1923, the Nation's ophthalmologists were repeatedly urged to send their specimens to the Museum along with the always-important clinical histories. As a result, the more than 50,000 cases now on file in the Registry of Ophthalmic Pathology provide much valuable material for education and research.

The diagnostic and consultative service which the Museum has provided civilian ophthalmologists over the years has not been confined to the field of pathologic anatomy, as the following interesting exchange of correspondence at-

FIG. 22—Colonel Virgil Heath Cornell, MC, USA, Curator of the Army Medical Museum, 1933-1935. Neg. No. 57-348.

tests. In February 1934, Major V. H. Cornell (fig. 22), then the Curator of the Museum, learned through Dr. John N. Evans of Brooklyn that an original Helmholtz ophthalmoscope had just been presented to a Boston hospital by Dr. David Harrower of Worcester, Massachusetts. Major Cornell wrote to Dr. Harrower, advising him of the unexcelled collection of ophthalmoscopes in the Museum and invited him to contribute the original Helmholtz instrument, since the Museum contained only an "excellent copy" of the original Helmholtz.

Dr. Harrower replied on February 28, 1934 as follows:

The Helmholtz ophthalmoscope that you asked about was brought to this country by Dr. Foster Haven, from Europe in 1858. Dr. Haven started the practice of ophthalmology about that time. When the Civil War broke out, Dr. Haven went to the front, where he was killed.

This instrument with a very rare set of trial glasses, and frames, also brought from Europe, came into the possession of Dr. Thomas H. Gage, from whom I received them.

Last year, I presented a small collection of spectacle frames and ophthalmoscopes, to the Howe Laboratory, in the Massachusetts Eye and Ear Infirmary in Boston, in memory of my dearly beloved friend, Dr. George S. Derby.

I think if you would write to Dr. F. H. Verhoeff, who has charge of the collection, he would be glad to have a photograph made for you.

Trusting to have the pleasure of meeting you sometime, I am,

Cordially yours,
/s/ David Harrower

Dr. Verhoeff advised Major Cornell on March 8, 1934, that he would present the matter of giving the Museum the Helmholtz ophthalmoscope at the next meeting of the Howe Library Committee, though he doubted very much if they would be willing to part with the instrument. However, on June 1, 1934, Dr. Verhoeff advised Major Cornell as follows:

I am sending you the ophthalmoscope that Dr. Harrower presented to the Howe Library Museum, but it certainly is not an original Helmholtz ophthalmoscope, because it has a silvered mirror and the first Helmholtz Ophthalmoscope did not have a silvered mirror. If, after you have examined it, you do not find it of sufficient interest to keep, or if you already have one like it, please return it to us.

The instrument was received at the Museum, examined, and returned to the Massachusetts Eye and Ear Infirmary in June 1934 with the following report from Major Cornell addressed to Dr. George H. Bigelow, Director of the Infirmary:

Thank you very much for your courtesy in sending us the ophthalmoscope, which was received in good condition.

We are returning it by parcel post insured this date as, after inspecting it, Major Davis, who has made quite a study of these instruments, has decided that it is not a Helmholtz instrument but a Jaeger of which we already have several specimens. I am enclosing a photograph of a Helmholtz instrument of 1851,* of our own Jaeger, 1854 (Acc. No. 22143), and of the instrument presented to your collection by Dr. Harrower. I am also enclosing a list of notes made by Major Davis on which he bases his conclusions that this instrument is a Jaeger. You will note that Dr. Haskett Derby contributed one of the 1854 model Jaeger instruments to the Army Medical Museum in 1901.

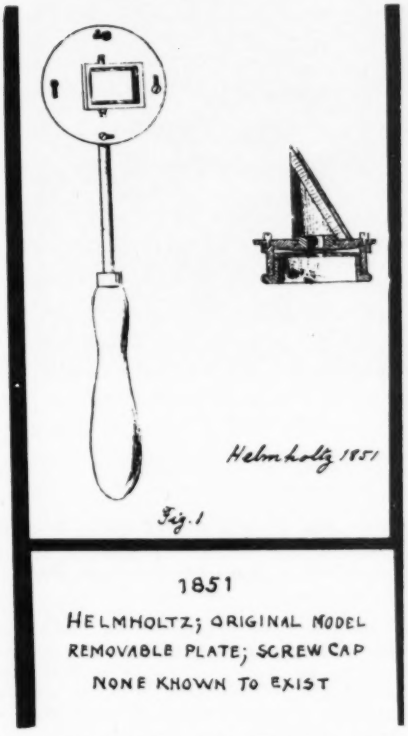

FIG. 23—Sketch of original Helmholtz ophthalmoscope from old ophthalmoscope exhibit of Army Medical Museum. Neg. No. 33533-2.

I assure you we appreciate very much your kind cooperation but as this is not the instrument that we had hoped it might be, we are returning it to your collection with our sincere thanks.

Thus the Museum, as a result of its long and intense interest in ophthalmoscopes, was in a position to make a positive identification and to squelch the rumor that an original Helmholtz ophthalmoscope was in the possession of the Howe Laboratory of Harvard University.

The Museum became actively interested in the collection and study of ophthalmoscopes, largely under the influence of Dr. Harry Friedenwald of Baltimore who, together with Dr. Casey Wood, formed a committee to arrange exercises and an historic exhibit for the American Medical Association's meeting of 1901, to commemorate the fiftieth anniversary of the invention of the ophthalmoscope. Before that time the Museum had acquired only six or seven ophthalmoscopes. Drs. Friedenwald and Wood consulted with the Surgeon General of the Army and the Curator of the Museum, as a result of which it was decided that the Museum should ideally house and preserve for posterity the Nation's collection of old ophthalmoscopes. On June 22, 1901, Dr. Harry Friedenwald, in a letter to the Curator, stated that the Section on Ophthalmology of the American Medical Association, at its annual meeting in St. Paul, adopted a resolution to arrange a permanent historical exhibit of ophthalmoscopes at the Museum. All physicians who had loaned ophthalmoscopes for the exhibit at the AMA meeting were invited to contribute their instruments to the Museum. Unfortunately, the response was not as enthusiastic as Drs. Friedenwald and Wood had hoped. Thirty years later, on October 22, 1930, Dr. Harry Friedenwald wrote as follows to Major George R. Callender, who was then Director of the American Registry of Pathology.

*See figs. 23 and 24.

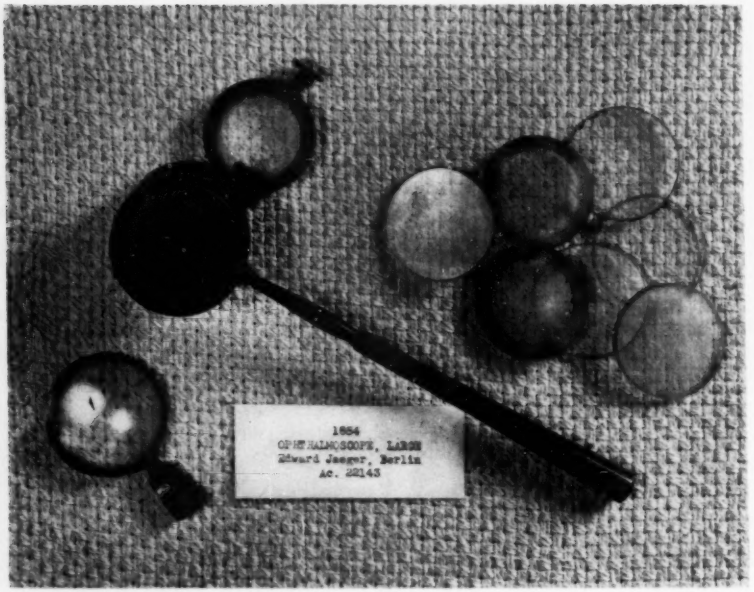

FIG. 24—Jaeger ophthalmoscope (1854) from Army Medical Museum's Ophthalmoscope collection. AFIP Acc. No. 22143.

Many years ago, on the occasion of the 50th Anniversary of the invention of the ophthalmoscope, I undertook, on behalf of a small committee composed of Dr. Casey A. Wood and myself, to arrange for an exhibition of ophthalmoscopes at the Minneapolis meeting of the AMA.

I am sending a brief description of this collection because all remembrances of it has probably been lost, except to those who saw it. I secured a large number of instruments as loans for this exhibition, some of which were quite unique. Thus, for example, a large Ruete ophthalmoscope was exhibited which could not be found in Germany when they arranged a similar exhibition and the committee had to construct one from the original description.

At the close of the exhibition, I took the matter up with your Museum and suggested that an endeavor be made to obtain as many of these instruments as gifts or permanent loans for your Museum, and I wrote requests to those who had been kind enough to loan their instrument for the Minneapolis exhibition asking them to give or loan them to the Army Medical Museum. I remember that a number of valuable instruments were promised in this way.

On visiting the Museum, I was able to find but a very few and I am writing to ask whether an effort could not be made to have an adequate exhibition in the Army Medical Museum. I believe that even now, some of these instruments that were described could be obtained, and certainly others. With the passage of time, it will become more and more difficult to secure these instruments. I should like to know what your views are on the subject.

With kindest regards, I am,
Very truly yours,
/s/ Harry Friedenwald

Major Callender replied to Dr. Friedenwald that the collection of ophthalmoscopes had not been forgotten and that the entire collection was being "worked-up" with a view to its exhibition in one

IN REPLY REFER TO S. G. O.

WAR DEPARTMENT.
OFFICE OF THE SURGEON GENERAL,
ARMY MEDICAL MUSEUM AND LIBRARY,
WASHINGTON.

22 Apr. 1939

Dr. Harry Friedenwald
1212 Eutaw Place
Baltimore, Md.

Dear Dr. Friedenwald:-

The Helmholtz instrument we have was purchased in 1902 from J.Odelga, Vienna. It was listed in his catalog of 1887, and the purchase order specifically stated it MUST be exactly like the one listed in the cat. of 1887. This instrument differs from the original in that the PLATE is fixed and not removable, the original had a plate with 4 screws and was removable, the cap is a friction one while in the original cut of Helmholtz monograph the description states "eingeschraubt ist", screwed in. The cut also shows screw action. Photograph of this cut on exhibit.

Concerning the ~~fire~~ shown at the meeting of 1902, correspondence was had with the owners of many of the instruments which resulted in some being donated and one or two were purchased. Of the five listed as Helmholtz none was obtained. The pictures of these instruments all show the PLATES are fixed and no evidence of being removable all probably had friction caps. I tried about 1929 to locate some of them but no trace could be found of Harlan and Chisholm, Dr. Thomson, or Jeffries. That of Dr.Young he stated he had given it to North Western University.

I was particularly anxious to secure that of Dr. Thomson as it had belonged to Brinton who was an early Curator of this Museum.

The Library has copies of Hemlholtz publications, any way thanks for your offer to inspect your copy.

I have tried several places to have a copy of the original Helmholtz duplicated but the cost is almost prohibitive. If we ever get flush with funds I intend to have a copy made.

If you ever part with your instrument do not forget this collection as it would form a valuable part of it.

Very truly,

Harry A. Davis
Maj, USA Ret.
Hist. Section.

FIG. 25—Major Harry A. Davis' letter of April 22, 1939, inviting Dr. Harry Friedenwald to contribute his Helmholtz ophthalmoscope to the Museum's collection (see figure 29). Neg. No. 60-5501-4.

place, as it had not been exhibited since 1922.

Dr. Friedenwald's suggestion was followed and an effort was made to contact the descendents of those deceased who owned instruments at the time of the 1901 AMA meeting, but, unfortunately, in every case, no trace of such instruments could be found. In 1930 the collection was relabeled and placed on full exhibit at the Museum.

The Museum presently has a large descriptive catalogue of its ophthalmoscope collection. This catalogue was prepared in 1944 by Major Harry A. Davis, U. S. Army Retired. Major Davis

DR. JONAS S. FRIEDENWALD
DR. ERNST BODENHEIMER
1212 EUTAW PLACE

BALTIMORE-17 MD. March 14, 1950.

Dr. Ruell A. Sloan, Curator,
Medical Museum,
Washington, D. C.

Dear Doctor Sloan:

Replying to your very kind letter of February 20th, I desire to express my great satisfaction with the complimentary note of the services I have given to the Museum.

I have definitely determined to present my Helmholz Ophthalmoscope as a permanent gift to the Museum. In this my son, Dr. Jonas S. Friedenwald, joins heartily.

There are certain features of the gift which require special mention. The instrument was made by E. Sydow, an able optical mechanic of Berlin. It was made by the order of Professor Albrecht von Graefe in the first year in which Helmholz described his invention, and von Graefe used this very instrument during his all too few years of medical practice. These facts were communicated to me by Mr. Sydow who regained possession of the instrument after von Graefe's death. In 1868 I obtained the instrument from Mr. Sydow, at which time I was serving as first assistant in the Eye Clinic of Professor Julius Hirschberg.

I confess that the possession and use of this instrument by Professor von Graefe has ever made it more precious to me.

I am also sending the earliest description of his "Augenspiel" if you will accept it as a companion piece to the ophthalmoscope.

I am not familiar with the regulations of the Museum. You will therefore permit me to state that I should not insist upon the instrument being withheld from any loan for exhibit purposes, provided that adequate safeguards against its possible injury or loss are assured.

Awaiting your reply and a safe courier to Washington, I am

Very truly yours,

Harry Friedenwald

FIG. 26—Dr. Harry Friedenwald's letter of March 14, 1950, advising the Curator of the Army Medical Museum of his decision to place his Helmholtz ophthalmoscope in the Museum's collection. Neg. No. 60-5501-5.

was then in charge of the Historical Section of the Museum and is the person who identified as a Jaeger the alleged original Helmholtz instrument given to the Howe Laboratory by Dr. Harrower. On March 14, 1950, Dr. Harry Friedenwald presented his own Helmholtz ophthalmoscope as a permanent gift to the Army Medical Museum. This acquisition is of especial historical significance because it was made especially for Professor Albrecht von Graefe, who ordered it the year Helmholtz described his invention (figs. 25-29).

DR. HARRY FRIEDENWALD
DR. JONAS S. FRIEDENWALD
DR. ERNST BODENHEIMER
1813 EUTAW PLACE

BALTIMORE-17, MD.

May 2, 1951.

Dr. Ruell A. Sloan
Medical Museum
Armed Forces Institute of Pathology
7th St. & Independence Ave. S.W.
Washington 25, D.C.

Dear Dr. Sloan:

You will remember that a little over a year ago I brought you the Helmholtz ophthalmoscope which my father had purchased in Berlin during his student days there. My father had been assured by the manufacturer that this particular instrument had been originally made for Professor Von Graefe and had been re-purchased from Von Graefe's estate after his death.

My father was quite sure that he had had a certificate from the manufacturer stating the facts about this instrument and I had made an extended search for that certificate before turning the instrumont over to you, and was very unhappy at the time not to have been able to find it. Just today, in going over some of my father's papers, I came across the certificate which I am happy to send you enclosed as an addendum to the original gift of the instrument.

With kind regards,

Sincerely yours,

Jonas S. Friedenwald, M.D.

FIG. 27—Dr. Jonas S. Friedenwald's letter to the Curator on May 2, 1951, announcing his recovery of the document which verified the fact that his father's Helmholtz ophthalmoscope had originally belonged to Professor Albrecht von Graefe (see figure 28). Neg. No. 60-5501-6.

Colonel Albert E. Minns, Jr., the present Curator of the Museum of the Armed Forces Institute of Pathology, has asked me to call to your attention that the Medical Museum is still very much interested in acquiring ophthalmic and otolaryngic instruments of all types. Any of you who are in the possession of old surgical instruments which you would like to donate to the Museum's historical collection should contact Colonel Minns at the Museum, or you certainly may write to me.

EDUCATIONAL ACTIVITIES

1. *On-the-Job Training*

When the Army Medical Museum first began its concerted efforts to provide diagnostic service in ophthalmic pathology, the staff pathologists and technicians had to be trained for this new work. Initially most of this training was provided by Dr. Verhoeff, and later by Doctors Friedenwald and Theobald. Major Callender, some of his successors in the position of Curator of the Museum, and other members of the staff ulti-

FIG. 28—Letter written June 1889 to Dr. Harry Friedenwald by Emil Sydow, who constructed the Helmholtz ophthalmoscope for Professor Albrecht von Graefe, confirming the fact that von Graefe had used the instrument in his practice. Neg. No. 60-5501-3.

mately became extremely competent ophthalmic pathologists by virtue of their opportunity to study the collected cases in the Registry and to learn from their predecessors. Besides Callender, James E. ("Dee-Dee") Ash (fig. 30), Elbert ("Frenchy") DeCoursey (fig. 31), and Helenor Campbell ("Hellie") Wilder (fig. 32) became especially well known because of their interest in ophthalmic pathology. As Callender pointed out at the Academy meeting in 1953, Mrs. Wilder, who joined the Museum staff shortly before the establishment of the Ophthalmic Pathology Registry and who became a student of eye pathology with him and his successors at the Museum, is and has been the person to whom the highest credit is due for the operation of the Registry and the success it has

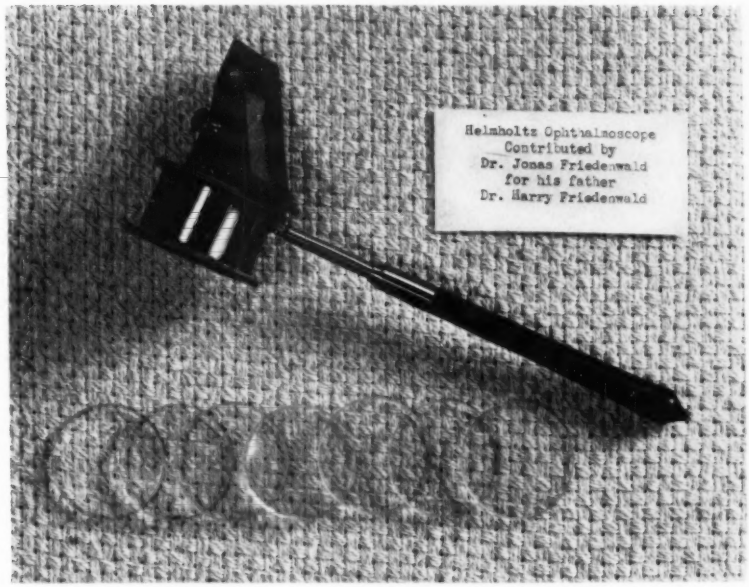

FIG. 29—Professor Albrecht von Graefe's Helmholtz ophthalmoscope obtained by Dr. Harry Friedenwald in 1888 (see figures 26-28). AFIP Acc. No. 295211.

achieved. Her outstanding contributions to histopathologic technique; her magnificent exhibits displayed over the years at the annual meetings of the Academy and at other national and international meetings of ophthalmologists; her extensive studies of intraocular neoplasms, of ocular injuries sustained by soldiers in World War II, of the ocular pathology observed in atomic bomb casualties; and then shortly before her retirement from the Registry, her demonstration of nematode larvae in pseudoglioma, hitherto blamed on almost everything but parasites, and toxoplasma in a disease which had for years been called tuberculous, testify not only to her own industry and ability as an ophthalmic pathologist but also to the value of having a large central Registry of Ophthalmic Pathology.

Another person who has participated in this on-the-job training, initially as a recipient of training in ophthalmic histopathologic technique, and subsequently, over a long period of time which encompasses the entire life of the Registry, as an instructor of technicians who have come to the Museum and to the AFIP for training, is Mr. Lawrence P. Ambrogi, now Chief of the Laboratories Branch of the Armed Forces Institute of Pathology. We have been remarkably fortunate that a person of his ability, personality, and interest in ophthalmic pathology has remained in almost continuous employment at the Institute since 1920.* The only interruptions were between 1922 and 1926, part of which time

*On December 17, 1960, while preparing an eye for histopathologic study in the laboratory of the Washington Hospital Center, Mr. Ambrogi was stricken with a massive myocardial infarction, which proved fatal the following day. "Larry" will never be forgotten by his many friends and colleagues, nor will he ever be replaced. It is fortunate, however, that he had always shared his "tricks-of-the-trade" so generously, and that his lovable character and diplomatic nature "rubbed off" on so many of his associates. His influence will be long-lasting.

FIG. 30—Colonel James Earle Ash, MC, USA, who during his two tours as Curator of the Army Medical Museum and Director of the Army Institute of Pathology guided the organization for a longer period than any other person since the Army Medical Museum's second Curator, Lt. Colonel Surgeon George Alexander Otis, who spent 18 years as Curator. During Colonel Ash's second tour the Registry Program experienced its greatest growth and the "Museum" blossomed into the Army Institute of Pathology. Neg. No. 81108.

was the two-year period when he accompanied Callender to the Far East.

Thus the Museum (as Gradle predicted) soon became a "Mecca" for training in Ophthalmic Pathology. Over the years this phase of the educational program based on the Registry material has become increasingly prominent. For several years now, the Academy has sponsored a Fellow in Ophthalmic Pathology at the Armed Forces Institute of Pathology. In addition, many others have come to study the Registry material on funds provided by their respective military services or civilian institutions, by the Heed Ophthalmic Foundation, by the National Institute of Neurological Diseases and Blindness, and by other philanthropic organizations. At the present time there are seven such full-time

FIG. 31—Brig. Gen. Elbert DeCoursey, MC, USA, who as a young pathologist assigned to the Army Medical Museum became much interested in ocular pathology and prepared the first three editions of the old Atlas in collaboration with Ash, Wilder, Ambrogi and Reeves. Later General DeCoursey became the first Director of the AFIP in its new building at Walter Reed Army Medical Center. Neg. No. 55-14699.

physicians in training and almost as many part-time trainees in the Ophthalmic Pathology Branch of the Armed Forces Institute of Pathology. Similar on-the-job training is given to histopathology technicians sent to the Armed Forces Institute of Pathology by their respective Institutions to learn the methods used to prepare and stain celloidin and paraffin sections for light microscopy and ultrathin methacrylate sections for electron microscopy of the eye.

2. *Instruction by Reports*

From the standpoint of individual instruction, one of the least appreciated but probably one of the most significant contributions of the Registry program

FIG. 32—Dr. Hans F. Smetana presenting Mrs. Helenor Campbell Foerster (the former Helenor C. Wilder) with a gift from her friends and colleagues at the time of her retirement from the Armed Forces Institute of Pathology. Others in the picture are Mrs. James E. Ash and General DeCoursey. Neg. No. 53-9249-2.

throughout the years has been the subtle yet profound effect of providing a detailed gross description and histopathologic report together with representative microslides to the pathologist and/or ophthalmologist who contributed each specimen to the Registry. In the early days, these reports often had extensive direct quotes from such leading authorities as Dr. Verhoeff, and even today in controversial situations the opinions of several experts may be obtained and forwarded to the contributor along with the opinions of the Registry staff. By reviewing the microslides along with the written reports, many ophthalmologists have, over an extended period of time, been better able to keep up in the field of ophthalmic pathology, even though they might be located in a rural area far away from any large medical center. In certain larger cities where residency training programs in ophthalmology are in effect, these reports and microslides are used for group instruction. I should like to re-emphasize that, in my opinion, this extremely subtle and unpublicized educational activity of the Registry is the one which probably has the greatest practical influence on the contributors to the Registry.

3. *Preparation of Exhibits*

It is historically significant that in the initial proposal to establish a Museum of Ophthalmic and Oto-laryngologic Pathology at the Army Medical Museum, Dr. Gradle outlined to the Academy his plans, which included the hope that not only would interesting and instructive cases be exhibited at the Museum but also that the Museum would have at the annual meeting of the Academy, an exhibit of interesting cases sent in during the year is somewhat limited." Later, however, Gradle's dreams came true and a series of fine exhibits based on the Registry collection was prepared for the Academy and for other important meetings (fig. 33). By 1928, exhibits had been sent to meetings in Minneapolis, Montreal, Detroit, Boston, London, and Colorado Springs. Some of the more outstanding exhibits of recent years have covered such subjects as Comparative Anatomy of the Eye (1941), Condi-

FIG. 33—At the 1947 Academy meeting Colonel Ash demonstrated temporal bone pathology of aviators while Mrs. Wilder described the ocular pathology found in atomic bomb casualties. Neg. No. 547-B.

ing the year (fig. 16, Gradle, 1921). Such an exhibit was prepared for the 1922 Academy meeting though, judging from Gradle's letter to Surgeon General Ireland (already quoted) and from some of his initial annual reports, these first few exhibits must not have met his expectations. At the 1924 meeting he complained that the Academy membership was not supporting the program to the extent which it should and, as a result of this, "the display we have set up this

tions of Unusual Interest in the Registry of Ophthalmic Pathology (1943), Injuries of the Eye (1944), Malignant Melanoma of the Uveal Tract (1949), Organisms Identified in Inflammatory Lesions in the Eye (1953), Pathologic Diagnosis of Granulomatous Inflammations of the Eye (1954), Pathology of the Optic Nerve (1955), Processing of the Whole Eye in Paraffin (1958), and Clinicopathologic Study of the Cornea (1959).

4. *Loan Sets*

In his 1926 report, Gradle indicated that "eventually the Museum will prepare study sets of 100 or 200 characteristic specimens, that will be loaned to men throughout the country for a period of 3 or 4 months as they desire in order that men may carry on their pathologic studies at home without having to leave their work." Preparation of these loan sets was a costly affair that required annual subsidization by the Academy. However, in the two decades that followed, several large and quite complete loan sets were prepared and these have proved to be of very great value, particularly to those individuals who once or twice each year find it necessary to make an intensive review of ophthalmic pathology prior to writing the American Board Examinations. These study sets are also used in formal courses offered at the Armed Forces Institute of Pathology as well as in Universities where similar sets are not available. By 1930 Callender was able to report that in the course of the previous five years, twelve sets of 100 slides each had been prepared under the auspices of the American Academy of Ophthalmology and Otolaryngology and concluded, "Thus the use of the collection as an educational measure has been included in the activities of the department."

5. *Atlases*

The first extensive use that was made of the Registry Collection for illustrative purposes was in Dr. Jonas S. Friedenwald's book on "The Pathology of the Eye," published by the Macmillan Company in 1929. This book was extensively illustrated with 253 photomicrographs from the collections of the Wilmer Ophthalmological Institute and from the Army Medical Museum. Most of these illustrations were prepared by Miss Helenor Campbell (who later became the famous Mrs. Wilder).

The first real Atlas of Ophthalmic Pathology and its companion in Otolaryngic Pathology were the outgrowth of the syllabuses which were prepared to accompany the loan sets of slides. It was felt that the Atlases, because of their greater convenience, would have broader appeal to busy clinicians who desired to review the pathology of their specialties. In addition, they made it possible to cover the fields more comprehensively, as there was not the limitation in selection of cases through scarcity of material for slides that restricted the scope of loan sets. At the instigation of Dr. Ralph A. Fenton in 1937, the Academy sponsored the publication of the Atlases as part of its educational activity. The first edition of the Atlas of Ophthalmic Pathology appeared in 1938 under the joint authorship of Captain Elbert DeCoursey, Pathologist to the Registry, and Lieutenant Colonel James E. Ash, Curator of the Army Medical Museum, with credits to Mrs. Helenor C. Wilder, Microscopist, Mr. Roy M. Reeve, Photographer, and Mr. Lawrence P. Ambrogi, Technician.

The Atlas of Ophthalmic Pathology immediately received an enthusiastic response, and on December 10, 1938, Colonel Ash wrote to Dr. Gradle that the first printing of the Atlases was already exhausted and "we are about half way through the second." The second edition of this book, which came out the following year, and a third edition prepared in 1942 were products of the same collaboration.

Then, following the end of World War II, it was felt that there was a need for combining the Atlas with additional textual material that would cover not only the fundamentals in descriptive pathologic anatomy of the eye but also

certain basic principles of pathology (Benedict, et al., 1953). Thus the Academy and the Institute of Pathology (then named the Army Institute of Pathology) again joined forces to establish a committee under the guidance of Dr. Brittain F. Payne which would undertake the preparation of a new Atlas and Textbook on Ophthalmic Pathology. After many years of hard work, the first edition of this book was published in 1952 with Dr. Jonas S. Friedenwald serving as Editor-in-Chief. Several years ago, a new committee of authors headed by Dr. Michael J. Hogan was established by the Academy and the Armed Forces Institute of Pathology to prepare a second edition of this Atlas and Textbook, which will be available within a few months.

6. *Formal Courses*

Beginning in about 1937, the Registry staff began to participate in formal teaching programs. For many years the staff was responsible for the pathology portion of the postgraduate course in ophthalmology given by the George Washington University (fig. 34). After World War II, with the great increased demand for instruction in all aspects of medicine and pathology, the number of formal courses in which the Registry staff participated greatly increased. These included, in addition to such well established endeavors as Dr. Georgiana Theobald's annual course in Ophthalmic Pathology presented at the time of the Annual Meeting of the Academy and Dr. Parker Heath's two weeks of ophthalmic pathology during the Lancaster Courses in Ophthalmology offered each summer, short special courses offered at the Institute. The annual course in Ophthalmic Pathology conducted at the Armed Forces Institute of Pathology has become increasingly popular so that it has become necessary to turn away each year many who cannot be accommodated by the limited facilities available. Thus another of Gradle's great visions, which he was so timid about expressing in his letter to Walter R. Parker on August 26, 1922 (see above), has come true. The Registry staff has also played host to the Ophthalmic Pathology Club at each of its annual meetings since 1947, except for the one held at Willis Eye Hospital in Philadelphia in 1954 (fig. 35).

RESEARCH ACTIVITIES

While Dr. Harry Gradle seems to have been the person most interested in and responsible for developing a center of ophthalmic pathology, he was principally concerned with the need for furnishing diagnostic service and for providing postgraduate education. I believe that Dr. George R. Callender deserves the credit for calling attention to the fact that this ophthalmic pathology collection and the Registry into which it evolved would provide a wealth of material for important research.

Perusal of the first several annual reports prepared mainly by Dr. Gradle reveals little if any evidence that the collection eventually might be used for research. However, in 1928, Callender and Campbell revealed that a questionnaire (history form) had been prepared under the direction of the committee representing the American Academy of Ophthalmology and Otolaryngology, the American Ophthalmological Society, the Section on Ophthalmology of the American Medical Association, and the Army Medical Museum. It was hoped that the cooperation of the contributors in providing the clinical data requested by the questionnaire and in following up their cases would result in the accumulation of much interesting and valuable information. Then, in 1930, after the American

FIG. 34—One of a series of postgraduate classes in ophthalmic pathology sponsored by George Washington University at the Army Medical Museum. Colonel Ash and Mrs. Wilder are standing among the students. Neg. No. 540-2.

FIG. 35—First annual meeting of the Ophthalmic Pathology Club, April 1947. Of the 14 meetings held to date, 13 have been at the AFIP. Neg. No. 517-2.

Registry of Pathology had been formally established and the Section and Museum of Ophthalmic Pathology had provided the material for the first of the constituent registries, i.e., the Registry of Ophthalmic Pathology, Callender outlined the object of the Registry program and indicated how this national collection might be used for research purposes. He pointed out that except at the large medical centers, too few cases of any one kind can be accumulated to obtain results on which reasonable clinical judgments can be based. By combining the cases accumulated by the centers with the cases of the American Registry of Pathology obtained from the country as a whole, it would be possible to obtain considerable numbers in a much shorter time. It was the purpose of the Registry, therefore, to cooperate to the fullest extent with all such groups to the end that uniform nomenclature might be used and that the greatest amount of knowledge might be obtained in the shortest time. He pointed out that the value of such investigations had been repeatedly demonstrated, but never better than by the Registry of Bone Tumors of the American College of Surgeons (see Codman's reports of 1922-1926). He stated that by means of the study of these cases many lives had been saved and many deforming operations had been avoided. The Registry had made significant advances in the knowledge of the criteria for diagnosis, the outcome, course and methods and treatment of bone tumors, and was still adding to the accumulated knowledge of these tumors.

Thus the Registry of Ophthalmic Pathology would be used for research in a manner comparable to that which had proved so fruitful in the field of bone tumor pathology. The following year, Callender showed that this was not merely a dream but that actual results had already been obtained. It was at the Academy meeting of 1931 that Callender described his histopathologic classification of malignant melanomas of the uvea (which was based on 111 cases) and called attention to the diagnostic significance of his classification. As no precedent was found for this method of classification of malignant melanotic tumors of the eye in a search through the Index Catalogue of the Army Medical Library, no bibliography was appended.

In opening the discussion of Major Callender's historical paper, Dr. Jonas S. Friedenwald stated:

> We are all deeply indebted to Major Callender, not only for his beautifully clear presentation of this important study, but also for the interest and tireless diligence which he has for so long given to the ophthalmic collections of the Army Medical Museum. Our Society has a very special interest in this work. The Section on Ophthalmology of the American Medical Association and the American Ophthalmological Society joined with us in 1923 to establish a special ophthalmic division in this national Registry of Pathology, thus enabling physicians all over the country to send specimens and get well considered pathological diagnoses. But the contributions of the other Societies have been mainly spiritual, while that of this Academy has been the material essence, without which the division would not have functioned. It is very fitting that the first important statistical study to emanate from this collection should be presented before this Society.

Recently, in talking with Dr. Callender, I found him to be extremely modest and unwilling to speak about many of his historically significant contributions in getting the Registry program started, but I did learn that he was extremely pleased that his original classification of the uveal melanomas had stood the test of time and that the very much larger data that we now have only substantiate the observations which he reported in his initial paper of 1931.

In his annual report of 1931, Callender also summarized the data which had been accumulated from the 45 cases of retinoblastoma received up to that time. It is of interest to note that in that initial series, the incidence of bilaterality (approximately 25 per cent) was essentially the same as it is today but the number of cases in which involvement of the optic nerve and extraocular extension had occurred was very much larger than in a comparable series of today. In that initial series of 45 cases, there were 13 in which the nerve was involved and 17 additional cases in which there was extension outside the globe. As Reese has pointed out in his book on "*Tumors of the Eye*," the less extensive involvement of retinoblastomas seen nowadays is a tribute to the progress that has been made by ophthalmologists in a relatively short span of time. The advances which have been made in educating parents, pediatricians, and ophthalmologists are responsible for the better prognosis afforded the unfortunate child who is born with retinoblastoma today. Significantly, Callender called attention to the fact that in that first series of 45 cases there were no deaths from the tumor when it had not extended beyond the limits of the globe itself.

The final paragraph of Callender's 1931 annual report to the Academy is of interest:

> The undersigned has not been informed officially of any action taken by the Council with reference to the American Registry of Pathology for the purpose of financing a continuation of this work. The table above indicates rather marked increase in the work and the necessities for such action. It is recommended that the council of the American Academy of Ophthalmology and Otolaryngology give official approval to this effort and take whatever means may be at their disposal to assist in obtaining funds to place the whole project on a sound, permanent, financial basis.
>
> /s/ George R. Callender,
> Registrar

For a number of years thereafter, the annual report provided much statistical information concerning special studies, particularly those based on the collection of uveal melanomas and retinoblastomas. One of the most complete reports of that type was included in Cornell's report of 1936. By that time, 54 cases of melanoma of the choroid had been followed five years or longer, Mrs. Wilder had developed her improved technique for silver impregnation of reticulum fibers, and Callender and Wilder showed that the more heavily fibered tumors had a much better prognosis than those tumors in which there were few reticulum fibers. Thus, in addition to cytologic classification, the pathologist had an additional histopathologic method of estimating prognosis.

The continued interests of the Army Medical Museum in the affairs of the American Academy of Ophthalmology and Otolaryngology provoked the following letter of appreciation addressed to Major General Charles R. Reynolds, who was then Surgeon General of the Army, written by Dr. Ralph A. Fenton, a member of the Board of Trustees of the American Medical Association and an officer of the Academy on October 9, 1936, following the 1936 meeting:

> My Dear General, The Council and Membership of the American Academy of Ophthalmology and Otolaryngology are very much pleased with the fine cooperation of Major Cornell and his staff in carrying on work in the pathology of these branches. His exhibit was greatly admired at our meeting in New York last week. Incidentally, Professor Larsell and I have again this year sent in our exhibit of Academy-Financed Research on the Sinuses (lymphatics and innervation) for inclusion in the permanent collections of the Army Medical Museum, and we are getting together a complete file of microscopic slides on our past five years' research to add to the

pathologic collection, as requested last year by Major Dart.

The research potential of a large central tumor registry was obvious after the early reports of Callender (1931), Callender and Wilder (1935), and Cornell (1936). Drs. Jonas Friedenwald and Conrad Berens were so stimulated that they influenced the directors of most of the country's leading Ophthalmic Pathology Laboratories to contribute their tumor cases to the Registry. Funds were provided by the Association for Research in Ophthalmology to expedite collection of the cases. As a result of this intensive nation-wide cooperative effort,* the melanoma collection grew rapidly from 273 to 1,238 cases and made possible the very important report by Wilder and Callender in 1939.

Since these studies of intraocular neoplasms are of such historical importance to the Registry, I would now like to show you that these famous collections are still under investigation and that during the past several years they have provided data which have helped answer a number of important questions.

In 1954, for example, Dr. Maumenee stimulated one of his former residents, Dr. Milton Flocks, to see if there was any relationship between the size of a choroidal melanoma and its tendency to metastasize. This was not merely an academic question but one of considerable clinical importance. Difficulties in differential diagnosis are much greater and more frequent with small lesions, and all too often eyes are enucleated because of the possibility that the lesion in question might be malignant. How much danger would there be if instead of performing an enucleation immediately, the patient were followed to determine whether the lesion was growing? Flocks' study led to the demonstration that there is a direct correlation between size of choroidal melanomas and their prognosis, small tumors having a much better prognosis than large tumors. Furthermore it was found that the probable reason for this difference was the associated difference in cell type found in the two groups. Small tumors are usually composed entirely of the more benign spindle cells, while most of the large tumors contain significant numbers of epithelioid cells (Flocks, Gerende, and Zimmerman, 1955).

A few years later, Makley and Teed were interested in determining the frequency with which malignant melanomas were found in enucleated eyes when the possibility of an intraocular neoplasm had not been suspected clinically. In analyzing 1000 consecutive cases in the Registry, these investigators found that in 113 (11.3 per cent) the tumor had not been suspected. Most of these eyes had opaque media which prevented visualization of the fundus and they were enucleated because they were "blind and painful." Makley and Teed then asked themselves the question, "What is the danger of not enucleating a blind eye with opaque media?" They found that in almost 4 per cent of adult Caucasian eyes that were blind for at least six months prior to enucleation and in which the fundus could not be visualized because of opaque media, malignant melanomas were present.

It had long been suspected that melanomas of the iris were less malignant

*The principal contributors were W. L. Benedict, A. B. Cushman, P. DeLong, R. Dominguez, B. Fralick, J. S. Friedenwald, W. E. Fry, S. R. Gifford, B. Klien, A. Knapp, H. D. Lamb, W. F. Moncrief, C. S. O'Brien, L. T. Post, A. B. Reese, B. Samuels, T. L. Terry, G. D. Theobald, J. A. de Veer, and C. V. Weller.

TABLE II

MALIGNANT MELANOMA OF THE CHOROID AND CILIARY BODY: ACTUARIAL SURVIVAL RATES BY CELL TYPE FOR LIVING VERSUS DEAD WITH TUMOR BASED ON A STUDY OF 1872 CASES

INTERVAL FROM ENUCLEATION TO LAST KNOWN STATUS (YEARS)	SPINDLE A	SPINDLE B AND FASCICULAR	MIXED AND NECROTIC	EPITHELIOID
0 - 1	100.0	100.0	100.0	100.0
1 - 2	100.0	98.6	91.9	94.4
2 - 3	100.0	96.3	74.4	83.5
3 - 4	100.0	93.2	61.6	68.6
4 - 5	100.0	88.6	53.6	57.8
5 - 6	93.1	85.6	46.3	94.4
6 - 7	90.2	83.4	43.0	48.2
7 - 8	90.2	81.9	40.3	45.8
8 - 9	90.2	79.4	37.0	45.8
9 -10	86.6	78.5	34.4	45.8
10-11	84.6	75.1	31.8	43.9
11-12	82.4	73.6	30.9	43.9
12-13	82.4	71.9	29.5	43.9
13-14	79.6	70.6	28.5	40.8
14-15	79.6	68.7	28.1	40.8
15 and over	79.6	68.7	27.0	33.0

than were those of the posterior uvea, but since these tumors are so much less common it took longer to accumulate sufficient data to provide the evidence. In 1958 Rones and I showed that about one half of all iris melanomas in the Registry collection were resectable by iridectomy and that this conservative procedure would suffice. The life span of our patients was not affected by this type of tumor.

Now I would like to give you some of the most recently compiled data based on the Registry collection of malignant melanomas of the choroid and ciliary body. I am indebted to Mr. B. L. Parnell, in particular, for these data because he had to spend such long hours at night and on week ends to make it possible for me to present these tables and graphs to you. These data are based on 1872 cases in which the interval between enucleation and last follow-up has been five years or longer. Those cases received in the Registry since the end of 1955 are not included. Patients who died of other causes and those who were "lost-to-follow-up" are also not included in these data. In earlier studies, we had found that the prognosis of patients with "spindle B" and "fascicular" tumors is very similar. Therefore, in the present study, these two groups have been lumped together. For the same reason, the "mixed cell type" and "necrotic" categories have been grouped together. From the data in table II and the actuarial curves shown in figure 36, we can make some interesting observations and speculations. Most obvious, of course, is the great difference between the curves for spindle A, spindle B, and fascicular on the one hand, and epithelioid, mixed, and necrotic, on the other. The former have a very much better prognosis than the latter, as has been well known since Callender's first report in 1931. These new data, however, reveal the spindle A tumors to be less benign than was once believed. These appear to be much more

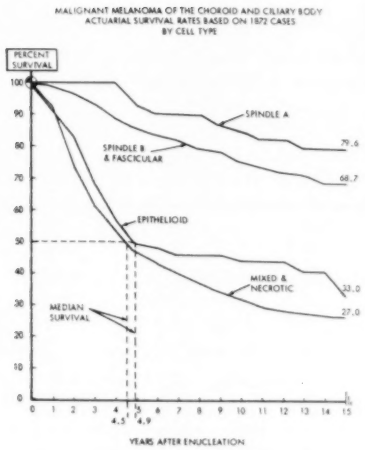

FIG. 36—Actuarial survival curves for malignant melanoma cases based on data shown in table II. Neg. No. 60-5499-2.

slow-growing tumors, requiring follow-up for longer periods to detect their lethal nature. During the first four years there were no deaths from spindle A tumors, while approximately 10 per cent of spindle B, 42 per cent of epithelioid, and 46 per cent of mixed and necrotic melanomas proved fatal. After the first four years, however, the death rate of patients with spindle A melanomas paralleled that of patients with spindle B tumors. Likewise, the difference in prognosis of patients with the more malignant tumor types (epithelioid, mixed, and necrotic) was most clearly demonstrated during the first five years, after which the death rate paralleled that of patients with spindle cell tumors. From these data we may make the following contrasting generalizations: (1) more than half of patients whose tumors are of the epithelioid, mixed cell, or necrotic types will die within five years, and more than two thirds will be dead within fifteen years; while (2) less than one third of patients with spindle cell melanomas will have died even after fifteen years.

Dr. Tom McKenzie, towards the end of his Academy-sponsored Fellowship at the AFIP last year, initiated a new clinicopathologic study of the retinoblastoma cases contributed to the Registry prior to 1956. Most of the patients have been traced and the data are still being analyzed by our statisticians, but I can give you a few preliminary results that are of interest. From the curves shown in figure 37 and the data presented in table III we can make several interesting

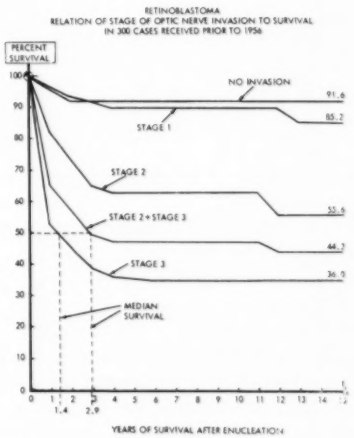

FIG. 37—Actuarial survival curves for retinoblastoma cases based on data shown in table III. Neg. No. 60-5499-1.

observations concerning the prognostic significance of optic nerve extension. Invasion of the optic nerve head up to but not beyond the lamina cribrosa (stage 1) appears to have no prognostic significance, for when compared with those tumors that have not invaded the nerve head, the respective survival curves can almost be superimposed. Extension beyond the lamina cribrosa, however, and involvement of the nerve at the plane of surgical transection (stages 2 and 3, respectively) do significantly worsen the prognosis. If we compare those cases in

TABLE III

RETINOBLASTOMA:
ACTUARIAL SURVIVAL RATES BY STAGE OF OPTIC NERVE INVASION
FOR LIVING VERSUS DEAD WITH TUMOR BASED ON A STUDY OF 300 CASES

INTERVAL FROM ENUCLEATION TO LAST KNOWN STATUS (YEARS)	NO INVASION	INVASION			
		STAGE 1	STAGES 2 + 3	STAGE 2	STAGE 3
0 - 1	100.0	100.0	100.0	100.0	100.0
1 - 2	95.8	96.5	65.4	82.6	53.1
2 - 3	91.6	93.0	57.2	73.9	45.3
3 - 4	91.6	91.2	49.9	65.2	39.1
4 - 5	91.6	89.4	47.2	63.0	36.0
5 - 6	91.6	89.4	47.2	63.0	36.0
6 - 7	91.6	89.4	47.2	63.0	36.0
7 - 8	91.6	89.4	47.2	63.0	36.0
8 - 9	91.6	89.4	47.2	63.0	36.0
9 -10	91.6	89.4	47.2	63.0	36.0
10-11	91.6	89.4	47.2	63.0	36.0
11-12	91.6	89.4	47.2	63.0	36.0
12-13	91.6	89.4	44.2	55.6	36.0
13-14	91.6	85.2	44.2	55.6	36.0
14-15	91.6	85.2	44.2	55.6	36.0
15 and over	91.6	85.2	44.2	55.6	36.0

which there is no extension beyond the lamina cribrosa with those in which the tumors have infiltrated the nerve beyond the lamina, we find that there is only about a 10 per cent mortality in the former while more than half the latter are dead within three years. The curves are of further interest because in all groups considered, the curves become flat after the first three years. This suggested an analysis of the time interval between enucleation and death in the fatal cases (table IV). This revealed

TABLE IV

RETINOBLASTOMA:
DURATION FROM ENUCLEATION TO DEATH

YEARS	NUMBER	PER CENT
Total deaths	78	100
Within 1 year	46	59
1 to 2 years	15	19
2 to 3 years	10	13
3 or more years	7	9

TABLE V

RETINOBLASTOMA:
EXTENSION INTO THE CHOROID

DEGREE OF INVOLVEMENT	TOTAL PATIENTS	LAST KNOWN STATUS			
		DEAD		ALIVE	
		NO.	%	NO.	%
Moderate to marked	83	53	64	30	36
Slight	45	10	22	35	78
None	108	6	6	102	94

that more than half the deaths occurred in the first year and all but 9 per cent within the first three years. The very significant way in which choroidal invasion influences prognosis is shown in table V. Only 6 of 108 cases without choroidal invasion proved fatal, while almost half of 128 cases with choroidal invasion died.

As most of you know, the Registry collection has not only provided much other valuable information concerning neoplasms but has also aided investigators who have been interested in many other problems. Two of the most significant contributions which have come out of the Registry collection were made possible by Mrs. Wilder's very exhaustive investigations in the field of intraocular inflammation, which led to her discovery that two parasitic diseases (toxoplasmosis and visceral larva migrans) account for more eyes that have been lost to the ophthalmic pathology laboratory than have tuberculosis and syphilis.

Time does not permit me to review the many pieces of research that have been made possible by the Registry, but to aid the interested reader, I have appended a bibliography arranged chronologically which includes most of the significant contributions that have been made by workers who have used the Registry collection.

THE FRIEDENWALD REPORT

In 1949 Dr. Jonas S. Friedenwald made a thorough analysis of the functions and problems of the Registry. These were considered under the three headings of (1) diagnostic service, (2) educational activities, and (3) research.

1. The diagnostic service in ophthalmic pathology had grown to an annual workload of about 1700 whole eyes plus 700 biopsy specimens and/or sectioned eyes, and there were reasons to fear a further increase in the accession rate in the years ahead. Friedenwald believed such a routine workload to be about twice the optimum needed for training purposes. On the other hand, he recognized the very great value of the diagnostic service rendered to civilian ophthalmologists by the Registry, and for this reason, he did not favor any abrupt curtailment of this service. The heavy workload was burdensome to the technical and secretarial staff, and the already great backlog in the laboratory was increasing at a rate of about 200 eyes per year! The quality of the work was considered "superb" but there were simply not enough technicians to keep pace. Because of this shortage, it was impossible to develop a greater variety of special staining methods and to apply new histochemical techniques to ocular histology and pathology. Friedenwald therefore concluded:

> If a serious effort is to be made to catch up with the current backlog and to care for continuous growth, assuming that the present accession policy will not be immediately changed, there are, as I see it, only two possibilities. (1) The staff of the Registry could be increased by at least one more technician. This would be extremely difficult within the present limitations of available space. (2) A greatly increased proportion of the cases could be run through paraffin instead of celloidin. At the present time paraffin technique is used for rush diagnoses and for some fresh injuries and phthisis bulbis. It would appear that a much larger fraction of the accessions could be put through paraffin without seriously depleting the supply required in celloidin for teaching purposes.

Friedenwald also recommended an active decentralization policy—the development and support of other military and civilian laboratories for ophthalmic work. This he believed important, not

only to free the staff at the Registry and give them more time for research work, but also as he stated:

From the long run point of view of the advance of ophthalmic pathology, the maximal development of local diagnostic facilities is of major importance. Mail order diagnosis, no matter how good, can never be as enriching as the direct mutual consultation of the clinician and the pathologist. The more widely diagnostic responsibilities are disseminated, the more chance there is for the development of new concepts and new techniques. A maximal fruitfulness will, however, be achieved only if the local laboratories are closely affiliated with the National Registry. It would appear that the Ophthalmic Pathology Club could be developed toward the goal of more active affiliative relationships.

Several of Friedenwald's recommendations have since been put into effect. An ophthalmic pathology laboratory was established at the Fitzsimons Army Hospital in Denver in 1953 by Lieutenant James Duke. When Duke left the Army, Captain Frederick R. Carriker continued the work. In 1954 another laboratory for ophthalmic pathology was activated at the 6th Army Area Medical Laboratory by Lieutenant Alan Snyder. These laboratories not only received specimens from military installations in their respective geographic areas, but they also were sent many old "back-log" cases from the Registry. At that time a number of new civilian laboratories were established and older laboratories were expanding. Meanwhile additional technicians were assigned to the ophthalmic pathology laboratory of the AFIP, and in 1955 the laboratory and Registry moved into its new building on the grounds of the Walter Reed Army Medical Center, where larger and better facilities were available. Before leaving the old Museum building, the technical staff had begun to experiment with the paraffin technique for sectioning whole eyes. Since then they have mastered this procedure and the much more time-consuming celloidin method has been used only for selected cases.

The net result of all these developments between 1950 and 1955 was to reduce significantly the accession rate and virtually to eliminate the backlog. During the 5-year period 1955-1959, the average total annual accessions was down to 1725 cases (almost to the level recommended by Friedenwald), and of these, the number of whole eyes averaged 976 (compared with 1700 at the time of Friedenwald's report). The backlog of unfinished diagnostic work was gradually reduced to 391 cases at the end of 1959 from the record high of 3459 cases at the end of 1953.

2. The educational activities of the Registry were also considered at length in Friedenwald's 1949 report. He stated:

The fellowship posts represent the highest training facilities which the Institute can contribute, and a major effort should be made to bring this training up to the maximal possible level. Trainees should not be accepted for periods of study of less than one year and as soon as possible opportunities for apprenticeship in experimental research and for clinical correlation should be developed to enrich the instruction.

In discussing the problem with the current groups of trainees, I received the distinct impression that they needed more basic training in general pathology than they were receiving, and that the conferences of the various departments of the Institute could profitably be extended to include more elementary training than at present. Within the Ophthalmic division the pressure of the present diagnostic load is such that, in order to save time, each trainee works up the final report on his cases in private with Mrs. Wilder, and the rest of the group do not have the opportunity to participate in these discussions.

Though facilities for research within the vast collection are readily available to the trainees, not much use has so far been made of these opportunities and a more active stimulation in this direction would be desirable. While the trainees enter the Institute with little or no training in ophthalmic and general pathology and are not qualified to undertake independent research, they could with great profit be assigned to work on small scale problems under direction, and thus learn how to approach a research problem in the

field of ophthalmic pathology. The burden of such teaching would undoubtedly be heavy on the staff of the Institute but would not be devoid of rewarding aspects.

In order to keep as many facilities as possible open to the trainees, short term visits by individuals who merely want refresher courses or preparation for the Board Examinations should be discouraged. This is not meant to apply to the utilization of qualified individuals of the facilities of the Registry for short term studies.

Since then the fellowship program has been developed to a considerable degree, partly by the Academy and partly by other organizations, especially the National Institute of Neurological Diseases and Blindness, the Heed Ophthalmic Foundation, and the Council for Research in Glaucoma and Allied Diseases of the Alfred P. Sloan Foundation. The AFIP has followed Friedenwald's suggestion and has discouraged those who wish to come for short periods of study and has urged a minimum of nine months.

During each of the past three years there have been three or four Fellows who have come for periods of nine or more months of training, and the number of applicants for the next two years has exceeded the available accommodations. Friedenwald recommended "more active participation of trainees in formal teaching and in research." Each of the trainees gives one or two lectures in the annual AFIP Course in Ophthalmic Pathology, and as the Fellows progress in the program they assist in instructing the newer men in the routine diagnostic work. Participation in research projects is encouraged, and the majority of Fellows in ophthalmic pathology at the AFIP do complete at least one project deemed worthy of publication.

A fine example of what can be accomplished in a relatively short period was demonstrated to me by Dr. Milton Flocks, who, upon completing his residency in ophthalmology, came to the AFIP for six months as a Heed Fellow in July 1954. During this brief period Flocks initiated and largely completed two major projects based on Registry cases (a clinicopathologic study of 138 cases of phacolytic glaucoma, in collaboration with Littwin and Zimmerman; and a study of the size and shape of malignant melanomas of the choroid and ciliary body in relation to prognosis and histologic characteristics, in collaboration with Gerende and Zimmerman). In addition, he began a histopathologic study of the trabecula using tangential sectioning, which subsequently led to several publications (Flocks, 1956, 1958 and 1959).

Friedenwald found the Registry's loan sets to be in need of "reconditioning," and he suggested that these elementary sets be supplemented by more advanced sets. The latter, he believed, should be smaller sets covering more restricted aspects of ophthalmic pathology (e.g., uveitis, glaucoma, ocular tumors). During the past decade a considerable "stock pile" of special cases has been prepared for ultimate use in rejuvenating old sets and for use in smaller special sets. Much time and effort is to be spent in completing this work, and we plan to use the Academy's Fellows to assist in this endeavor.

3. With respect to research based on the wealth of material in the Registry, Friedenwald stated:

Considering the abundance or perhaps overabundance of the available material, the research production in the Registry has in the past been extremely scanty. This is not meant to disparage the quality of the work produced. The classification of melanomas and the study of the relation between histologic findings and mortality, represents a large contribution carried out in a long range and thoughtful manner, but the total research output of the Registry clearly indicates that relatively little time is spent by the staff or the fellows on

research. Moreover, little use of the facilities of the Registry has up to now been made by outside ophthalmologists for research purposes.

The small amount of research initiated and carried through by the staff must be considered from two points of view. In the first place the burden of routine activities especially in relation to routine diagnostic service has been overwhelmingly heavy. In addition to carrying the diagnostic load, Mrs. Wilder has been called on to make a large number of trips for formal teaching purposes. Each time she is away on such trips, it costs her several weeks of hectic effort to catch up on the diagnostic backlog. The difficulties of formulating and carrying through more than a minimum of research studies under these pressures are enormous. In view of these difficulties the scientific output of the Registry, small as it is, is a remarkable tribute to her industry and effectiveness.

This report was made just a few years before Mrs. Wilder presented the results of her great contributions to an understanding of the etiology of granulomatous inflammations of the eye. Her work, based entirely on an extensive review of the accumulated cases on file in the Registry, involved the application of a large number of special staining procedures in her search for microorganisms. This led, eventually, to a recognition of the fact that toxoplasmosis, in the adult as well as in the infant, is more important than tuberculosis as a cause of uveitis and blindness, and to the fact that a most important cause of "pseudoglioma" of the retina in children is a form of visceral larva migrans.

These and other important contributions made possible by the Registry material do not, however, negate Friedenwald's criticisms and his optimistic recommendation that the only answer is "the enlargement of the facilities, the increase of the Registry staff, and a curtailment of the growth of routine diagnostic service."

THE FUTURE?

Time has not been sufficient for me to give you a complete picture of all the current activity in ophthalmic pathology and research stemming from the Registry. I have intentionally kept this part of my presentation to a minimum, since our annual reports published in the TRANSACTIONS of the American Academy of Ophthalmology and Otolaryngology (see Hogan, 1954-1959) together with the bibliography that I have appended will provide the interested reader with additional information.

I would like to spend the remainder of my time in suggesting certain activities of the Registry which I believe should be curtailed, expanded, or otherwise changed to the benefit of all of us interested in advancing ophthalmology and ophthalmic pathology. Again these may be taken up in relation to consultative service, education, and research.

1. *Consultative Service*

I fully share the opinion expressed by Friedenwald (cited previously) that the volume of diagnostic work provided by the Registry at the time of his 1949 report was excessive, particularly in relation to the available staff. During the past decade, however, the volume has been decreased and the staff has been augmented so that the task is less burdensome. Our present *volume* is about optimum to provide ample new material for the trainees. I would, therefore, not recommend any further reduction in our accession rate. On the other hand, I would not consider it wise to increase our present diagnostic service for "routine" specimens.

There is, however, one group of "routine" specimens of which we have insufficient material. The Registry of Ophthalmic Pathology is composed almost entirely of surgical cases, and very little autopsy material is available for

teaching and research. There are many relatively common medical conditions which we lack. For example, we rarely receive eyes from diabetic or hypertensive patients unless an important ocular complication (usually secondary glaucoma) is superimposed on the initial process. This one-sided development of the Registry as a Registry of "surgical pathology of the eye" should be curtailed and an effort needs to be made to obtain more autopsy specimens.

I believe it would be very wise, if it were feasible, to increase the proportion of "unusual" or "difficult" cases to "routine" specimens contributed to the Registry. This could be accomplished if more "routine specimens" (e.g., recent trauma, phthisis bulbi, and absolute glaucoma) were sent to the many laboratories about the country that have expressed a desire to obtain more cases (see Hogan, 1955), and if these laboratories would forward to the Registry those cases considered unusual or particularly valuable for teaching or research.

I realize, of course, that it is tedious, time-consuming and expensive for the local laboratories to support the Registry in this manner. Extra slides, copies of the histories, copies of the reports, and subsequent follow-up histories in selected cases are required, and someone in each laboratory must take the time to prepare the cases for shipment to the Registry. It is only the enthusiastic appreciation of the value of a central Registry and what it can contribute that will promote the support of individual laboratory directors.

It is possible, however, that the Academy can aid in this program and by so doing also provide better experience for its trainees. There are a number of fairly large ophthalmic pathology laboratories throughout our country that have been active for a sufficiently long time that they, too, have an accumulated wealth of material. If the Academy's Fellow were sent to at least one such laboratory each year, he could assist the Director of that laboratory in selecting appropriate cases for the Registry and in the preparation of the material for shipment to Washington. In fact, if he were to travel by private auto, he could bring the material himself. We have an historic precedent for this technique of building up the Registry, because in 1937 Mrs. Wilder made an extensive tour, visiting most of the Nation's leading ophthalmic pathology laboratories for the express purpose of collecting melanomas of the uvea. This led to the rapid augmentation of the Registry collection and soon made possible more statistically significant follow-up studies.

To do something of this sort each year would require additional financial aid from the Academy, and it would also require the enthusiastic support of the various laboratory directors. If such a plan were approved, I would recommend first a visit to those institutions such as Washington University in St. Louis, Ohio State University in Columbus, and University of California in Los Angeles where autopsy material has become relatively more abundant than at most other laboratories.

2. *Educational Activities*

I have written to many people who, in the past, have been concerned with the Registry in one way or another, requesting assistance in planning for the future. All have emphasized the need for continuing and expanding the educational activities of the Registry, which, as I indicated earlier, include the subtle individual type of teaching provided by our detailed descriptive reports to contributors, on-the-job training of physicians and technicians, preparation of loan sets and atlases, and group instruction at formal courses.

Our own training of Fellows at the AFIP has not been entirely satisfactory because of the lack of a sufficient number of experienced staff pathologists to supervise all the activities. Friedenwald pointed this out at the time of his 1949 report, and it is just as true today—perhaps more so because of the increased demand for such on-the-job training.

Here, again, the Academy could help out. I would like to see the Academy sponsor a series of "Resident Consultants in Ophthalmic Pathology"—experienced teachers who would come to the AFIP for periods of two to four weeks to assist the Chief of the Ophthalmic Pathology Branch in training the Fellows. During such periods the Resident Consultant might give a few lectures or seminars, but his main service would be to help review the routine pathology reports being prepared daily by the trainees on the recently received specimens. During such periods of duty at the AFIP, he would also be encouraged to utilize the Registry material for his own research interests. Such consultants might also assist in preparing some of the advanced type of loan sets of slides on such special subjects as uveitis, vascular diseases, corneal dystrophies, and unusual tumors.

The practical problems we face in developing such a program are obvious: (1) the most experienced and qualified teachers are often too busy at home to get away for such long periods as two to four weeks, and (2) the program would require financial support. I feel optimistic, however, and believe that there are a sufficient number of good teachers and investigators in ophthalmic pathology who would be willing to give that much of their time every few years to promote such a program, particularly if they themselves could profit by the experience, as I am sure they would, by utilizing the material and facilities of the AFIP which we would make available to them. As for the Academy's supporting such a program, I am again confident because, if successful, its cost would be slight in comparison with its ultimate value. The better training of our young men, the cross-fertilization provided by having teachers and investigators come and go, and the increased utilization of Registry material for teaching purposes (study set, training manuals, etc.) and research would certainly justify continued support.

I have several times mentioned preparation of special study sets to cover more restricted fields. What I have in mind concerns more than histopathology. There is a definite need to correlate the clinical manifestations of certain diseases with their pathologic anatomy. With the ever-increasing use of photography by ophthalmologists, we are now in a much better position to present the clinical appearance as well as the histologic characteristics of many conditions. I envision our loan sets of the future as including kodachrome slides illustrating the clinical appearance of many of the *same* lesions used for preparation of microslides and being accompanied by appropriate case histories, descriptive data, pertinent discussion, and references.

To accomplish this ambitious task will, of course, require better-than-ever support by all of you. Always send in to the laboratory good case histories and whatever illustrations are available at the same time that you contribute your specimens. This should be done not only when cases are sent in to the Registry at the AFIP but also when you send specimens to your local laboratory. Remember that most of your local ophthalmic pathology laboratories are operating in cooperation with the central Registry. They aid us greatly in winnowing the material for the most valuable cases for teaching and research.

Such a plan for better teaching sets will also require added man hours of service by qualified teachers to select cases and prepare the descriptive material. It will also be costly and will need the Academy's financial support.

Recently, in a discussion of the future of our Registry, Colonel Joe M. Blumberg, Scientific Director of the American Registry of Pathology, suggested that we consider a great expansion of our educational program. There are vitally important new horizons for us to look towards in other lands. From an international viewpoint we are, today, in about the same stage of development as was ophthalmic pathology in the United States 40 years ago when Gradle and Callender began to develop their ideas for a national center.

There are two very important reasons why we should turn our attention towards other, less privileged countries. From a selfish point of view, we need to know more about their medical problems and we need to obtain their pathologic material for our Registry (just as it was once considered so important by Gradle that every American ophthalmologist send in his specimens to Washington). One might presume that at the Armed Forces Institute of Pathology we would have an excellent collection of pathologic eyes representing virtually every known ocular disease to which man and animals are susceptible, obtained from all parts of the World. This is what we should have, but we do not. Actually, ours is a rather provincial Registry. Material from cases of trachoma, keratomalacia, phlyctenular keratoconjunctivitis, and many other ocular diseases that are still so extremely important in certain areas, is virtually unavailable for study and research.

In addition to these epidemic diseases, there are other special problems. I would like to tell you briefly about three examples in the field of neoplasia that, on the basis of random observations made in the pathology laboratory, deserve special study. It has been our experience that true infiltrative squamous cell carcinoma is a rare conjunctival lesion in the United States. However, in the limited material we have received from contributors in Pakistan, we have been impressed by the apparently greater incidence of this epibulbar cancer. We have even seen a case of bilateral squamous carcinoma in a 10-year-old boy. Whether this is the result of genetic factors or environmental exposure to some carcinogenic agent is obscure; in fact, we do not even have enough information to know whether the observation of a seemingly high incidence of such tumors in Pakistan is valid. Similarly, in the limited material we have received from one large city in South America, we have repeatedly been impressed by the disproportionate number of cases of retinoblastoma and the paucity of melanomas. Finally, I would like to tell you of a fascinating group of cases Dr. William Spencer has received at the University of California.

During 1959 Dr. M. D. Hursh of the Sudan Interior Mission Hospital in Kano, Nigeria, contributed to the Ophthalmic Pathology Laboratory of the University of California five cases in which there was such massive lymphoid infiltration of the orbital tissues that a diagnosis of malignant lymphoma seemed justified in each instance. In two the lids and orbital tissues were involved, in two others the lids, orbital tissues, and uvea were affected, and in the fifth the lacrimal gland was greatly enlarged. Since lesions of this type are seen so rarely in the United States, Dr. Spencer was anxious to obtain more information about these patients. Dr. Hursh informed him that by strange coincidence two of the patients came from the same locality,

"strictly bush with no doctors or hospitals," and that they had died within three months after enucleation. At the time of enucleation neither patient had shown evidence of generalized lymphomatosis and the cause of death remains obscure.

From the foregoing, it is evident that we should develop an interest in geographic pathology of the eye in order to provide ourselves with needed materials for teaching purposes and to broaden our knowledge of the etiology, epidemiology, and pathogenesis of various ocular diseases. But, possibly, this rather limited and selfish point of view is not the most cogent reason to expand the Registry program internationally.

We have reasons for believing that there exists in many parts of South and Central America, Asia, the Middle East, and Africa a fervent desire for better medical education and teaching aids of all types. The potential which we have for promoting international good will by means of medical education is expressed in a letter which Colonel Blumberg recently received from the recipient of some study material in one of our neighboring Latin American countries:

> I am very grateful for the histopathology slides. Your collaboration not only helps in a cultural plan but demonstrates to the almuni of the Faculty that it is only propaganda what the Communists say that *North American Army is only another instrument of Yankee Imperialism.* By the above you might form a clear idea why this is significant to me and to those who practice Democracy.

Some of us believe that the American Registry of Pathology can do a great deal towards promoting genuine respect for the United States, as can each of the national societies which sponsor one or more of the constituent registries. Furthermore, as I implied before, there will be considerable "feedback" in the form of an increased number of cases contributed, better histories, more complete epidemiologic data, longer follow-up reports, etc.

I would give this proposed expansion of the Registry into the field of "geographic ophthalmic pathology" a high priority on the list of projects which the Academy should sponsor. A recent development in histologic technique has made possible the distribution of microscopic sections by first class mail at minimal expense and without fear of breakage (Ambrogi, 1960). It is now possible to mount and seal stained histologic sections in plastic sheets that can be folded, crumpled, or crushed without damage to the sections. Thus a whole teaching set of 100 sections can be assembled on about a dozen sheets of plastic (7x10 inches) which together with separating sheets of paper weigh about the same as 5 sections mounted in the usual fashion between glass slides (less than 2 ounces). Upon receipt at a medical center in some distant part of the world, the individual sections may then be cut out and mounted between glass slides in the usual fashion. Good histologic and cytologic detail may be obtained and the method can be used for mounting celloidin as well as paraffin sections.

3. *Research*

There is only one type of research that can be carried out by the Registry better than by any other organization with which I am familiar. This is the long-range follow-up study of remarkably large series of cases. I am very proud of our "detectives" who have tracked down patients even after their own ophthalmologists had considered them permanently "lost-to-follow-up." People like Miss Eleanor V. Paul, my

assistant, Mrs. Evelyn C. Espeut in our follow-up unit, and Miss May Fraker and Mr. B. L. Parnell in our statistical analysis unit make this work possible. I really do not believe there is a comparable organization anywhere else. For this reason, it is extremely important that we continue to use our great storehouse of accumulated cases that have been followed so carefully over the years and to utilize our remarkable organization to obtain the maximum information for the benefit of our patients, just as Dr. E. A. Codman planned to do when he organized the Nation's first national registry.

At this time I should like to acknowledge our sincere appreciation to all contributors to the Registry who have been cooperating with us, first by providing good clinical histories and illustrations at the time they send in specimens, and later by responding to our requests for additional data — particularly long-term follow-up reports. Without such cooperation the Registry could never have developed into what it is today. Now, I would be remiss in my duties as Registrar if I were to leave you with the impression that all our contributors are so helpful; unfortunately, such is not the case! This is directed to the comparatively small group of uncooperative contributors: please do not waste our time and yours by not sending in specimens if you cannot provide a history or are unwilling to help out later when we need more data.

Second in importance for the Registry are the more esoteric aspects of ophthalmic research, such as electron microscopy and animal experimentation, because these can be pursued wherever the research facilities and personnel are available and are not dependent upon the unique collection and organization available only to us in the form of our Registry.

With respect to the "follow-up" activities of the Registry, there is one important way in which the program could be developed to provide us with answers to some very perplexing questions that have been raised at recent Academy meetings. In opening the discussion of a paper presented at the 1955 meeting by Flocks and his co-workers, in which the thesis was advanced that small melanomas of the choroid have a better prognosis than do large tumors, Maumenee asked if anyone had followed a large series of patients with nevi of the choroid to determine how often these lesions would become malignant. At the 1957 meeting, a panel headed by Dr. E. B. Dunphy discussed "The Diagnosis and Management of Intraocular Melanomas." In summing up some of the ideas that had been expressed during the symposium, Dr. Dunphy stated:

> Finally, we feel that there remains a lot to be learned about the behavior of malignant melanomas of the uveal tract. This is often unpredictable in contrast to that of malignant melanomas of the skin, where a rapid downhill course is usual. We all know that some patients who refuse enucleation go on for years in perfect health with no sign of metastasis, while in others metastasis occurs in spite of early enucleation. Is it possible that early metastasis actually occurs in all cases but that in certain ones the tumor cells are restrained from growing in their new environment by some factor as yet unknown? In other words, do we actually save life by enucleation? May it not already be too late? No one knows for sure; until we have more knowledge on the subject, we must assume that we do and act accordingly.

At this point I would like to make a plea that every ophthalmologist make a special point to follow up his cases in which enucleation is not done and see what happens to them. Perhaps the American Academy of Ophthalmology and Otolaryngology might establish a registry to which such cases could be referred for periodic evaluation and follow-up. It is our hope that this will be done, for only by such a study can we get an answer to this perplexing question of whether or not enucleation really prolongs life expectancy.

I believe the Academy should give serious consideration to establishing a registry of "living pathology," as suggested by Dunphy and his co-panelists. Many large clinics already are following patients with uveal nevi or melanomas—patients who have refused enucleation or for whom enucleation has not been recommended. But the number of such cases in any one clinic is small, and without a large central Registry we shall never really be able to formulate any definite ideas about the natural behavior of these lesions: the frequency with which choroidal nevi become malignant, the rate of growth of small tumors, and the incidence of metastasis from small and large melanomas.

In the past all the Registries of the American Registry of Pathology have had as a basic requirement the acquisition of microscopic slides, blocks, and/or tissue from which a pathologic diagnosis can be established. Thus, the establishment of a new type of Registry in which the cases being registered would not be documented by histopathologic diagnosis would require a change in our basic policy. I feel confident, however, that if the Academy were convinced that such a Registry should be established and if the cases being registered were well documented by good clinical histories, fundus photographs, visual field charts, and the clinical opinions of a panel of experts who periodically would review and re-evaluate each case, arrangements could be made to formally establish this type of Registry.

We have already established informally and on a very small scale such a Registry to aid in establishing the natural behavior of a particular group of melanotic tumors of the optic disc (Zimmerman, 1960). For several years Dr. Lee Garron and I have been following a group of such cases in which the involved eye was enucleated. Our histopathologic studies and the follow-up reports have convinced us that these are relatively (if not absolutely) benign tumors, but only the clinical course of these lesions would really settle the issue. Fortunately our friends in several cities have sent us excellent drawings, kodachrome slides, visual field charts, and follow-up reports of their cases in which enucleation was either refused by the patient or not recommended by the ophthalmologist. As a result, we are slowly accumulating excellent data which support our contention that these are, in fact, benign melanotic tumors. I would like to show you a few examples of these tumors (figs. 38 and 39), if for no other reason than to invite you to send me additional examples. These are not common tumors and it will take us a long time to accumulate a sizeable series. Therefore, we need every case we can get and we shall appreciate your contributions to this special series.

I must emphasize that this special collection is a personal effort, not really an official function of the Registry of Ophthalmic Pathology. If, however, the Academy were sufficiently convinced of the value of such a registry of untreated tumors (especially choroidal nevi and melanomas) that long-term support would be guaranteed, I believe such an undertaking would be feasible.

4. *Committee on Ophthalmic Pathology*

The Academy's Committee on Ophthalmic Pathology has been a source of great encouragement to me personally, as have many other members of the Academy who, though not now on the committee, have great interest and confidence in the Registry and who realize its unique character and amost unlimited potential. To all these people, and in particular to Dr. Benedict, your efficient Executive Secretary-Treasurer, I want to give my personal thanks. I think

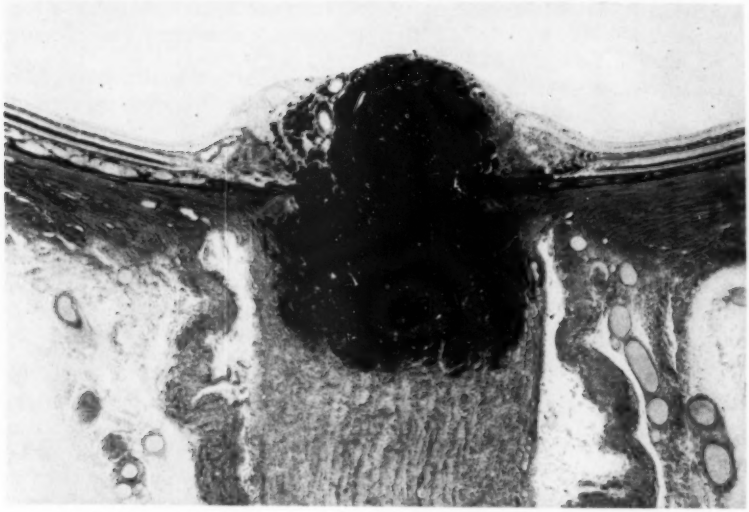

FIG. 38—Melanocytoma of optic nerve head. AFIP Acc. No. 507852 × 15.

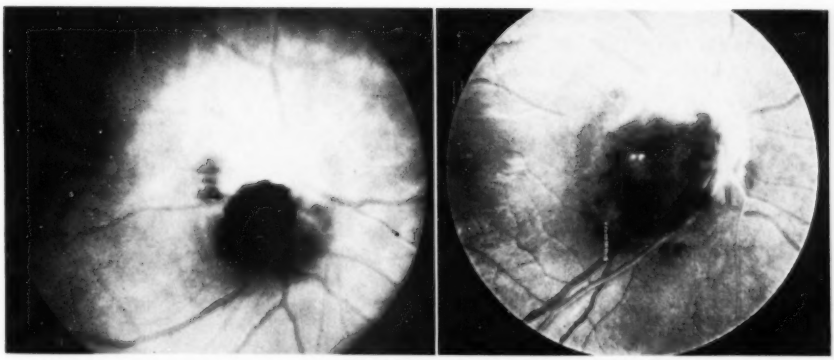

FIG. 39—Melanocytoma of optic disc. (A) Clinical case being followed by Dr. Robert C. Schopp of Buffalo, New York, with no definite change during eight years of observation. Neg. No. 57-5427. (B) Clinical case contributed by Dr. Manuel L. Stillerman of Chicago, Illinois, with no definite change during seven years of observation. Neg. No. 57-5385.

it is a remarkable tribute to both the Academy and the AFIP that, now after 40 years, the "union which had been effected between the Academy and the Museum" (Gradle, 1921) is as strong, healthy, and mutually dependent as it was at the beginning.

I do believe, however, that there is still room for growth and development, as I have just indicated. Furthermore, I believe that the Academy's Committee on Ophthalmic Pathology should be more active in discharging its dual responsibilities to the Academy and to the Registry. During recent years the principal work of this committee has been (1) the organization and supervision of a team to prepare a second edition of the Academy-sponsored book and atlas on "Ophthalmic Pathology," (2) stimulation of local ophthalmic pathology laboratories to accept an increasing number of specimens in order to relieve the Registry of some of its volume of routine diagnostic work, and (3) development of the training program in ophthalmic pathology at the AFIP. These have been large, important tasks and the Committee's chairman, Dr. Hogan, in particular, deserves the appreciation of all of us for the time and effort he has given to this work. On the other hand, I believe this committee could be even more active in promoting increased utilization of the opportunities available through the Registry. I think it would be very healthy and profitable for all concerned if at least once every year each member of the committee would visit the AFIP in the capacity of a consultant and critic — to find ways and means of assisting the Registry's activities in order to achieve maximum productivity and more efficient operation.

5. *Summary*

In summary, I have made the following observations and suggestions (with which the Director of AFIP concurs) for the Registry's future development:

a. Routine diagnostic work should be kept close to the minimum required to ensure adequate training of Fellows.

b. Consultative work and the acquisition of difficult or unusual cases should be increased.

c. Efforts should be made to obtain more autopsy material and to encourage contributors in other countries to build up a collection of "geographic ophthalmic pathology."

d. Support of on-the-job training of Fellows should be continued but not expanded, since our present capacity is already taxed, mainly by the shortage of qualified instructors.

e. A program of "Resident Consultants in Ophthalmic Pathology" should be started in order to provide more instruction for the Fellows and to promote greater utilization of the Registry material.

f. New study sets are required both to replace obsolete and damaged sets and to supplement the basic material with special collections to be accompanied by descriptive syllabuses, illustrations, references, etc. Distribution of such training aids to foreign countries needs to be encouraged.

g. Expansion of the Registry's follow-up program is important, since it affords a unique opportunity for this type of medical research. This activity needs continued and improved support from all contributors to the Registry.

h. The Academy's Committee on Ophthalmic Pathology should demonstrate greater interest and provide more consultation in guiding the future development of the Registry.

i. The Academy itself must augment its support of the Registry if we are to

begin to realize the remarkable potential of this unique organization.

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OBLITERATION OF THE CAVITY AND RECONSTRUCTION OF THE AUDITORY CANAL IN TEMPORAL BONE SURGERY

FREDERICK R. GUILFORD, M.D.
HOUSTON, TEXAS

AFTER fenestration, mastoidectomy, and certain tympanoplasty procedures, the mastoid cavity often becomes a problem both to the patient and to the physician. Long periods of postoperative care are required, since incomplete healing with intermittent or continuous suppuration, and the necessity for repeated cleansing of epithelial debris from the cavity are not unusual occurrences. For several decades otologists have attempted to find successful ways to eliminate this cavity after such operations. Although good control of the fenestration cavity has been achieved by placement of diced cartilage chips in the system of the periantral cells, efforts to obliterate the postoperative mastoidectomy cavity have been less rewarding.[2,4] The use of living despeciated calf bone paste was unsuccessful, because the bone was partially absorbed before it could become wholly organized into the fibrous mass in the cavity.

As early as 1932, Kisch used a temporal muscle flap in an attempt to obliterate the mastoid cavity and retain an external auditory canal.[5] Rambo has used a similar flap of temporal muscle in special circumstances to obliterate the external auditory canal and the cavity, and he has also used the temporal muscle technique in conjunction with fenestration of the labyrinth to improve hearing in patients who have chronic otitis media with tympanic perforation.[6,7] To facilitate healing, Beales has used a postauricular pedicle full-thickness skin flap, rotated into the mastoid cavity.[1] Richtner recently reported the use of a postauricular skin flap to which a portion of the postauricular muscle bundle is left attached, which he employs as a combined flap for tympanoplasty and for partial obliteration of the mastoid cavity.[8]

The most recent innovation for obliteration of the mastoid cavity has been reported by Schiller and Singer.[9] In this new technique, called *mastoid osteoplasty*, autogenous cancellous bone strips taken from the iliac crest are used to reconstruct the exenterated petromastoid and bony walls of the external auditory canal. When exenteration of the mastoid cells is not necessary in the tympanoplasty procedure, Wullstein[11] avoids formation of a mastoid cavity whenever possible by covering the epitympanic area and aditus with a long graft. It is also my practice to avoid creation of a cavity when tympanoplasty is performed, but often disease processes are so extensive that complete exenteration of the mastoid cells makes formation of a large cavity unavoidable.

A procedure has been devised which includes removal of the mastoid tip and

From the Department of Otolaryngology, Baylor University, College of Medicine.

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use of a muscle flap to obliterate the lower portion of this cavity.[2,4] By this means it is possible successfully to reduce the size of the bowl after operation on the pneumatized mastoid. This method has been adapted and modified so that now the residual cavity can be obliterated almost routinely. Secondary or delayed very thin Thiersch grafts are applied on the eighth to fourteenth postoperative day to ensure rapid healing of the external auditory canal. The resultant external canal is somewhat larger in the superior-inferior diameter, since the tegmen of the mastoid forms the roof of the new canal. The anteroposterior diameter may also be slightly larger, but it is often within normal limits. The desirable end result, of course, is total obliteration of the cavity with an external auditory canal that is of nearly normal size.

IMPORTANCE OF ELIMINATION OF THE CAVITY

After surgical procedures upon the temporal bone, the postoperative mastoid cavity is vulnerable to a degree that makes its ablation extremely important.[10] There are many advantages to obliteration of the cavity by the method currently in use. First, the newly constructed canal can heal rapidly because of the increased vascularity of the muscle aponeurosis which forms its posterior wall. The squamous epithelial surface of the new canal is favorably reduced in area in comparison to the lining of the small mastoid cavity, and greatly reduced in comparison to the larger cavity that is usually associated with a well pneumatized mastoid bone. There is also a decrease in epithelial desquamation and in the accumulation of debris. By means of the modified procedure it is possible to avoid the problems that occur with a slowly healing large cavity which sometimes has a dependent area. Postoperative suppuration is reduced or absent. Immediate control of suppuration and prompt healing of the area constitute a significant advance in surgery of the mastoid. Tympanoplastic reconstructive operations are definitely enhanced in value by this method of controlled healing, and the incidence of dermatitis of the graft is sharply reduced. Wullstein[11] has emphasized the relationship of dermatitis of the graft and continued mastoid suppuration. The attention of all otologists has been called to the frequency with which continuous suppuration and its subsequent deleterious effects have been reported.

INDICATIONS AND CONTRAINDICATIONS FOR CAVITY OBLITERATION

Ablative procedures are in order in almost any temporal bone procedure which requires total or subtotal removal of mastoid cells or bone structures and which leaves a bowl or cavity in the mastoid process. It is, of course, imperative that all disease in the cavity be removed or controlled before the area can safely be obliterated. Infected cells or cells which are potentially dangerous should be removed or exteriorized, and any vestiges of squamous epithelium must be wholly removed from the site.

Obliteration procedures are contraindicated in these instances:

1. When the cavity results from removal of a malignant or potentially invasive tumor.
2. When the patient has intracranial complications, including lateral sinus thrombosis, secondary to mastoid suppuration
3. When widespread cholesteatoma makes doubtful the total removal of all squamous epithelium
4. When removal of infected or possibly infected mastoid cells may have been incomplete.

ANATOMY OF THE POSTAURICULAR FLAP

The flap is composed of subcutaneous tissue, striated muscle fibers, and fibrous tissue from the various muscle aponeuroses. The thickness of the flap will vary with the individual patient. When the muscle flap is thin and the defect large, a broader and longer strip may be cut and then folded in order to increase its volume. Postauricular muscle flaps with superior pedicle or inferior pedicle are used, depending upon the cellular composition of the mastoid.

The structures involved in the inferior pedicle flap are the sternocleidomastoid, splenius capitis, and longissimus capitis muscles, which insert into the lateral aspect of the mastoid tip, the auricularis posterior (a small, vestigial muscle which is of little significance in the flap and which arises from the mastoid and inserts into the posterior portion of the pinna), the lower border of the temporal muscle, and, occasionally, the anterior part of the occipitalis muscle. The superior pedicle flap may be made of all of the structures named except the temporalis muscle. Whichever type is to be employed, a smaller flap from the lower border of the temporal muscle may be used as an adjunct, to round out the posterior-superior portion of the reconstruction of the external auditory canal.

The main blood supply for the inferior pedicle flap comes from the occipital artery. The sternocleidomastoid branch of the thyroid artery aids in the blood supply of the sternocleidomastoid muscle. The superior pedicle flap receives its blood through collateral circulation with the blood supply of the temporal muscle — the deep temporal branches of the internal maxillary artery and the middle temporal artery, as well as from the occipital muscle, which is, in turn, supplied from the occipital branch of the postauricular artery.

TECHNIQUE

After a radical mastoidectomy has been done, the problem of the operative cavity is eliminated by the use of a soft tissue flap. Combined endaural and postauricular incisions are employed for adequate exposure of the cavity, and soft tissue for development of the flap. The postauricular incision is made in the postauricular sulcus and extends from the upper attachment of the pinna down to the mastoid tip. Thus, the perichondrium on the posterior surface of the pinna is followed by means of sharp dissection into the mastoid cavity previously formed through the endaural incision. By making the incision in this fashion, the anterior edge of the postauricular muscle bundle is not divided and remains intact (whereas in the usual postauricular incision the anterior portion of the bundle is cut, and this portion is therefore not available for incorporation into the muscle flap).

In mastoid processes that have cellular tips, the tip is removed. In sclerotic mastoids with acellular tips, removal of the tip is unnecessary. In either instance, the soft tissue to be used is made up of the postauricular muscle bundle. The technique for formation of the obliterating flap differs according to the type of mastoid under operation. In the sclerotic mastoid with solid tip, the pedicle is formed superiorly, while in the well pneumatized mastoid from which the tip is to be removed, the pedicle of the flap remains inferior.

Postauricular Muscle Flap with Superior Pedicle

To obliterate the cavity which is associated with an acellular mastoid tip, the base of the pedicle is located at the junction of the posterior part of the temporalis muscle with the postauricular muscle bundle. The skin is first under-

mined by sharp dissection. The muscle flap is then formed by an incision which extends posteriorly in a moderate curve from the anterior border of the postauricular muscle bundle at the level of the mastoid tip for an appropriate distance. The incision is extended superiorly, parallel to the anterior border of the muscle bundle, up to the level of the

FIG. 1—Postauricular muscle flap with superior pedicle.

lower edge of the temporalis muscle. At the base of the pedicle, the incision curves slightly anteriorly in order to facilitate mobilization of the flap and to avoid tension in the posterior part of the mobilized flap. The incision thus made is a partial ellipse, with the curved end portion made inferiorly. The undersurface of the flap is separated by sharp dissection from the underlying periosteum (fig. 1).

The superior pedicle flap is then tailored to fit the cavity. By downward, forward, and medial displacement it is fitted into the bowl; at the lower border of the cavity, the muscle flap is bent.

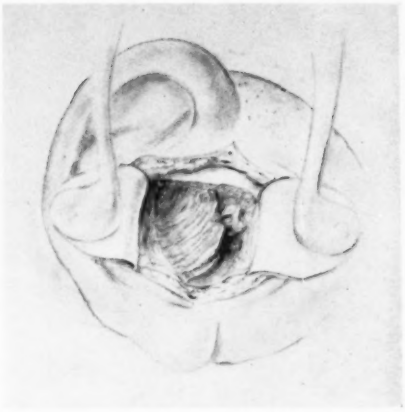

FIG. 2—View of superior pedicle muscle flap in place as seen through endaural incision. Note that the muscle flap does not extend onto the facial ridge.

The tip of the flap, then, turns medially to the tegmen over the posterior portion of the lateral semicircular canal. If an angular defect remains at the juxtaposition of flap and tegmen, a small flap may be cut from the lower border of the temporal muscle with the pedicle located posteriorly. This flap is then laid in place to round out the defect.

The superior pedicle flap should not be allowed to encroach on the space of the external auditory canal by extension anterior to the facial ridge. It should be of sufficient width and length to fill the cavity, with the tip of the flap against the tegmen in order to avoid formation of dead space (fig. 2).

After the muscle flap is fitted into the cavity, a skin flap, which is usually formed from the skin of the external auditory canal, with the pedicle on the facial ridge, is laid upon the muscle, which now forms the posterior canal wall. A fairly loose pack is placed in

the canal, which is completely lined with rayon strips. To assure proper conformation, cotton balls and diced synthetic photographers' sponge, impregnated with antibiotics, are used. Both endaural and postauricular incisions are then closed in the customary manner with interrupted nylon sutures. On closure of the postauricular incision, the overlying soft tissue of the pinna falls onto the postauricular muscle flap, and the mastoid cavity is obliterated. When the superior pedicle flap is used, a soft rubber drain is placed through the lower end of the incision and is left in place for three to four days.

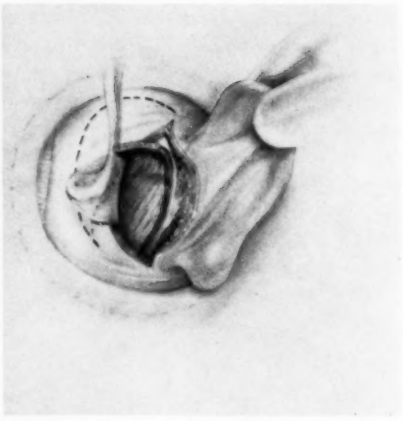

FIG. 3—Postauricular muscle flap with inferior pedicle.

Postauricular Muscle Flap with Inferior Pedicle

After removal of the mastoid tip, the skin of the posterior side of the postauricular incision is widely undermined by sharp dissection. Another area, superior to the end of the incision, is also undermined over the posterior end of the temporal muscle. With the skin adequately retracted, a flap of suitable size is dissected by incising from the junction of the temporal muscle and the postauricular muscle bundle upward to include a moderate amount of temporal muscle. The incision is continued posteriorly in a moderate curve and then downward in a line parallel to the anterior edge of the aponeurosis. As the incision approaches the mastoid tip location, the curve is slightly anterior, so that the flap (which will be of varying degrees of thickness) may have sufficient mobility for forward displacement. The incision, then, is a partial ellipse, with the curved end-section made superiorly. The flap is then dissected free from the periosteum on its undersurface (fig. 3). Appreciable bleeding may occur from branches of the occipital vessels, as well as from the communicating vein of the mastoid process. Hemorrhage is controlled by cauterization of the sectioned vessels. The flap should be cut so that it will intentionally be too wide and too long for the cavity. Careful tailoring will then allow for a precise obliteration of the cavity with maintenance of space for the external auditory canal. To increase thickness, a thin muscle flap which is too wide may be folded onto itself or doubled, front to back, at the tip. When placed in the cavity, the flap should not bulge forward anterior to the edge of the facial ridge, and should extend up to the tegmen at the posterior end of the lateral semicircular canal. In this manner, a properly fashioned flap will usually completely fill the bony defect in the mastoid cavity, except for the area of the epitympanic recess.

FATE OF THE POSTAURICULAR MUSCLE FLAP

The muscle bundle is originally made up of striated muscle fibers and the fibrous layers of the different muscle aponeuroses. Biopsy of the muscle flap on the tenth postoperative day has shown

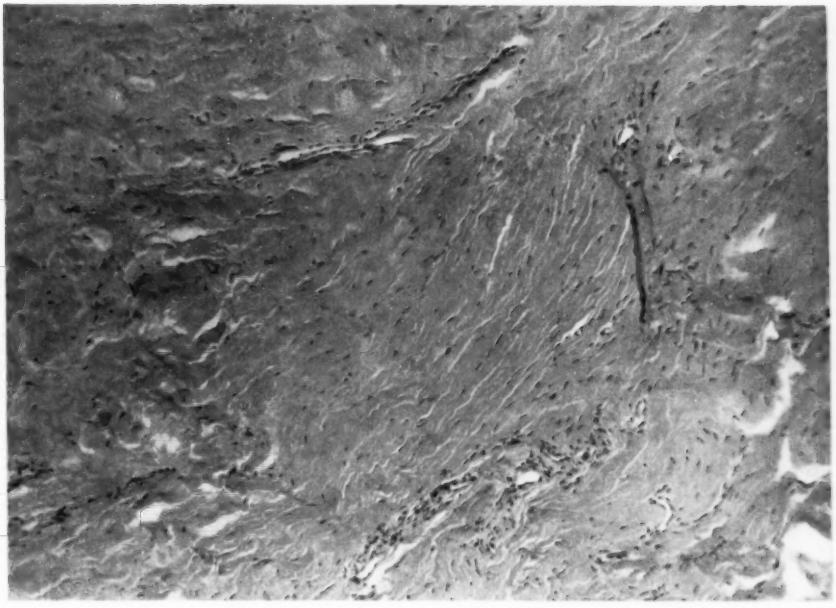

FIG. 4—Photomicrograph of fibrous tissue which replaced muscle flap.

varying stages of degeneration in these fibers, as well as early invasion of fibroblasts and round cell infiltration which are consistent with tissue healing and repair. Some of the blood vessels were partially obliterated, but others remained and contained apparently normal red blood cells. When tissue was taken for biopsy, the trimmed surface bled. This bleeding was a further indication that circulation had been maintained in the muscle flap. In one patient, a deep biopsy specimen of the obliteration flap was obtained after a period of six months had elapsed, and complete fibrosis of the muscle flap had occurred (fig. 4).

Transformation of the muscle flap into a firm fibrous mass of tissue that fills the cavity is the anticipated and desired result. Occasionally, slight contracture in the fibrous mass causes some widening of the external auditory canal in the anteroposterior diameter.

ADAPTABILITY OF THE TECHNIQUE

Mastoidectomy Cavities

Cavities after modified radical and radical mastoid operations may be obliterated by the use of superior or inferior pedicle muscle flaps, depending on the necessity for removal of the mastoid tip. In some cases a radical operation may constitute the first stage of an advanced tympanoplasty procedure. The mastoid cavity is obliterated and the external auditory canal is usually grafted secondarily in order to expedite healing. With control of suppuration, the tym-

panoplasty can be performed later as a second stage operation.

Cavities unhealed after some surgical procedure and in which suppuration continues may be revised and obliterated with this technique.

Tympanoplasty and Obliteration of the Cavity as a One-Stage Operation

After formation of the mastoid cavity and preparation of the middle ear for tympanoplasty, an appropriate graft is applied to the tympanum. It should be as small as possible, so that it will not extend over the facial ridge or the posterior part of the lateral semicircular canal. The tympanoplasty graft is packed in place, and an involuted rayon and cotton pack is placed on top of the first layer of tympanoplasty pack. The rayon and cotton pack is made by folding multiple rayon strips, petal-fashion, around cotton balls. This method of packing holds the graft securely in place, but the pack does not extend into the mastoid cavity. The postauricular muscle flap is then cut and tailored to obliterate the mastoid cavity.

Fenestration Cavity Revision

Application of the technique has been limited to revision of the suppurating cavity in connection with fenestration of the labyrinth, and has not been used in a one-stage operation including fenestration and obliteration of the cavity. An endaural incision is made, and the lining of the suppurating fenestration cavity is removed by incising through the fenestration flap at right angles to the fenestra, 3 mm. posterior to the bulge of the lateral semicircular canal. This incision extends superiorly through normal skin along the tegmen to the posterior part of the external auditory meatus. Another incision extends through healthy skin from the first incision along the facial ridge to the meatus. If the skin posterior to the facial ridge is healthy, the incision may pass behind the facial ridge and parallel to it, in order that a skin flap with the pedicle on the facial ridge may be formed. After obliteration of the cavity this skin flap extends up onto the new posterior wall of the canal. If the skin is ulcerated on the tegmen above the external auditory canal, or on the facial ridge, or on the anterior wall of the canal, the diseased skin is excised from the area. A postauricular incision is then made. The mastoid cells and, if necessary, the mastoid tip are removed. The postauricular muscle flap is formed, trimmed, and placed in the cavity. Care should be taken that the tip of the flap does not override the fenestration flap in any part. The usual precautions are taken to prevent overlapping of the flap onto the facial ridge. A pack is then placed in the canal, and the incisions are closed.

Revision of Postauricular Fistulas

The fistula can be excised while the postauricular incision is being made. The postauricular muscle flap is cut, trimmed to size, and placed in the mastoid cavity. The area of the previous fistula then overlies the postauricular muscle flap. The postauricular incision is closed.

POSTOPERATIVE CARE

The external auditory canal packs are removed on the fourth to seventh postoperative day. At the time of removal, if any portion of the muscle flap bulges over the facial ridge into the canal space, the excess tissue is trimmed with scissors. Appropriate antibiotics are administered systemically for six days. After removal of the canal packs, antibiotic drops are used locally in the canal until the day the skin grafts are applied. The antibiotic of choice is determined by

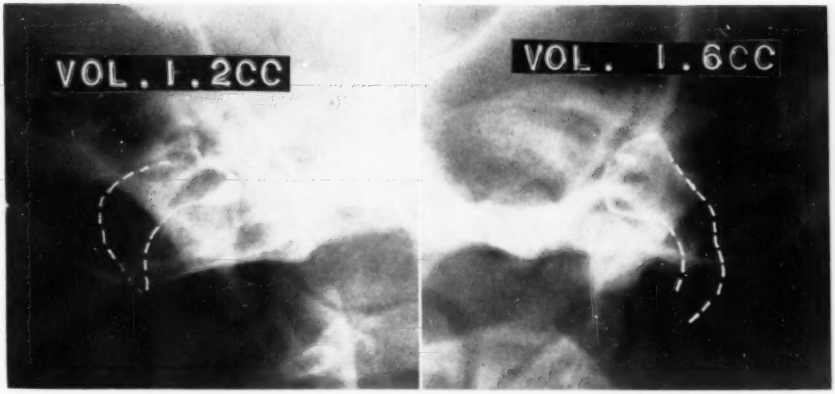

FIG. 5—(A) Roentgenogram following Dionosil study of normal right external auditory canal. (B) Roentgenogram following Dionosil study of postoperative left external auditory canal following Type IV tympanoplasty and obliteration of mastoid cavity (one-stage operation). (MMH)

preoperative culture and sensitivity tests. My customary practice is to apply thin split-thickness graft strips to the denuded areas of the canal on the eighth to fourteenth postoperative day. This is done according to the secondary skin-grafting technique previously described,[3] and it ensures prompt and complete healing of the canal and the epitympanic area. This step is, however, optional.

RESULTS

The postauricular muscle flap operation has been used to obliterate the mastoid cavity and to reconstruct the external auditory canal in 39 patients. In seven of these patients, large suppurating fenestration cavities have been revised and obliterated. All of the cavities are healed and the canals are of moderate size. After fenestration, the medial aspect of the canal is somewhat larger, since space must be adequate for exteriorization of the fenestra in the posterior epitympanic area. In the normal adult, the volume of the external auditory canal, when measured from the tympanic membrane to the level of the meatus at the rim of the concha, varies from 1 to 1.2 cc. In the seven fenestration canals the volume varied from 2.1 to 2.8 cc. Thirty-two mastoid and mastoid-tympanoplasty cavities have been obliterated. All the cavities are healed with small to moderate-size canals. The canals vary in volume from 1.2 to 2 cc. The time since operation varies from two months to one and one half years (fig. 5).

All canals were secondarily grafted on the eighth to fourteenth postoperative days with very thin split-thickness skin grafts. There have been no postoperative complications. The cosmetic effects are considered to be good, since the postauricular muscle flap filled the defect that is commonly associated with postauricular mastoidectomy. The average healing time was three weeks.

SUMMARY

Problems are known to arise during the postoperative healing of the mastoid cavity. A method for obliteration of the cavity with a soft tissue flap and of reconstruction of the external auditory canal has been described. This significant advance in mastoid surgery was mentioned as a possibility in 1954.[3] Contraindications for the procedure can now be enumerated. Details of the technique and suggestions as to its adaptability have been included, as well as the results of application of the method in thirty-nine patients.

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CARTILAGE KNIFE

For Removal of Longitudinal Cartilage Wedges

RICHARD T. FARRIOR, M.D.
TAMPA, FLORIDA

IN the method of otoplasty for protruding ears,[1,2] the removal of longitudinal cartilage wedges or grooves is utilized. These strips of cartilage are removed from the entire antihelix proper and the superior crus, and do not extend through the thickness of the cartilage (fig. 1). This removal has been accomplished satisfactorily in my hands with the no. 15 Bard-Parker knife, but this requires practice. A special knife for removal of longitudinal cartilage has been developed at the urging of resident physicians and others who have been interested in using this method (fig. 2).*

The cutting surface at the triangular tip of the knife is on the edge proximal to the handle. The continuous cartilage wedges or troughs are produced by a pulling motion, using multiple short strokes and with the handle held in a near horizontal position. No attempt is made to remove the strip of cartilage in one piece. Better results are obtained by using short strokes of equal depth, removing only a short strip of cartilage with any one stroke. All soft tissue is removed from the fossa antihelices on

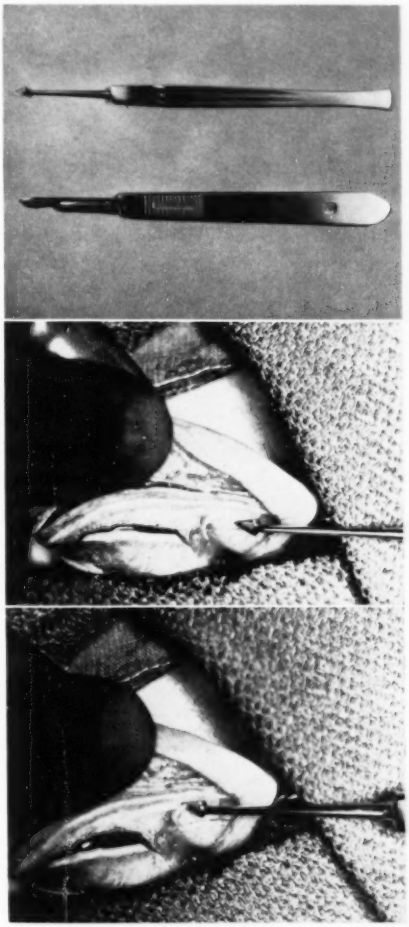

FIG. 2—(Top) The Bard-Parker no. 15 blade may be utilized for removal of the wedges, but the method is simplified by using the triangular-shaped knife being presented. The knife may also be used in nasal septal surgery. (Center) This illustrates the knife in relation to the ear and shows the near horizontal position in which the knife is held. (Bottom) The cutting surface is on the edge proximal to the handle. The strips are removed in a pulling motion utilizing short strokes of equal depth.

*The author would like to express his appreciation and thanks to Mr. Eric A. Storz for his help and ability in transposing the ideas for this knife into an effective surgical instrument. The knife may be purchased from the Storz Instrument Company.

Presented as a *New Instrument* at the Sixty-Fifth Annual Session of the American Academy of Ophthalmology and Otolaryngology, Oct. 9-14, 1960, Chicago.

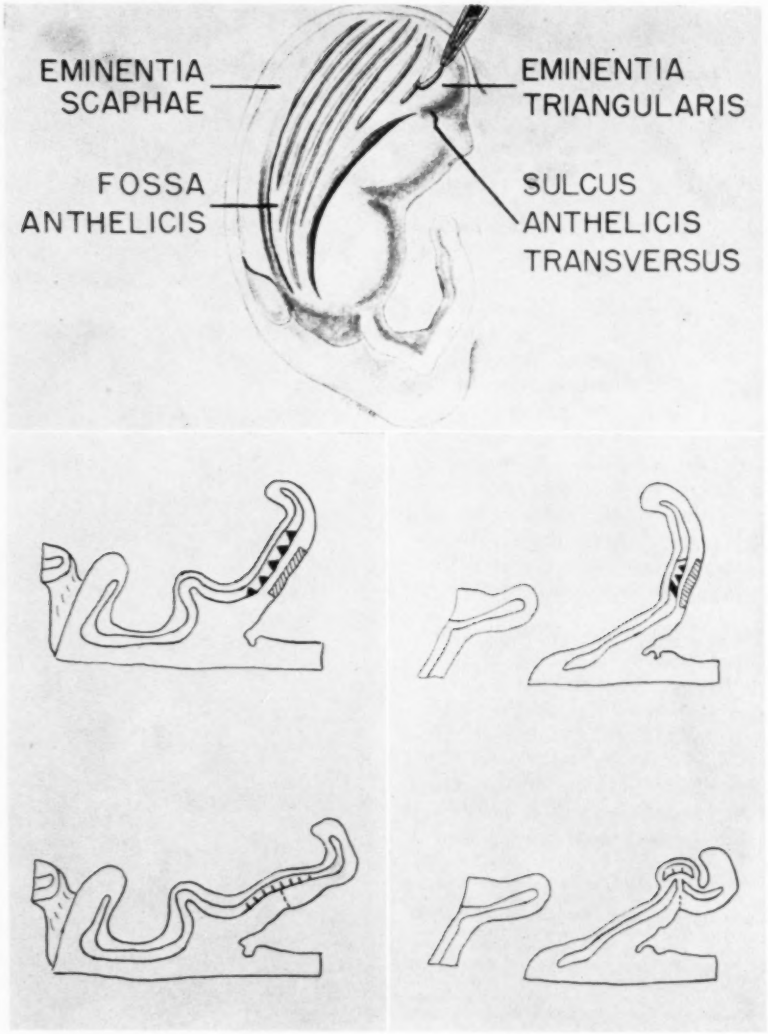

FIG. 1—(Top) The knife being presented was developed for removal of longitudinal cartilage wedges from the posterior surface of the auricle over the antihelix. Incisions through the thickness of the cartilage are made only about the concha and along the scaphoid fossa to the level of the junction of the crura. There are no incisions through the thickness of the cartilage about the entire superior crus and at the anterior margin of the junction of the crura. (Lower Left) Outline of wedges removed from the posterior aspect of the superior crus to produce a gradual convexity blending with the scaphoid and triangular fossae. (Lower Right) Longitudinal cartilage wedges are extended into the antihelix proper to produce an acute convexity on the anterior surface in this area.

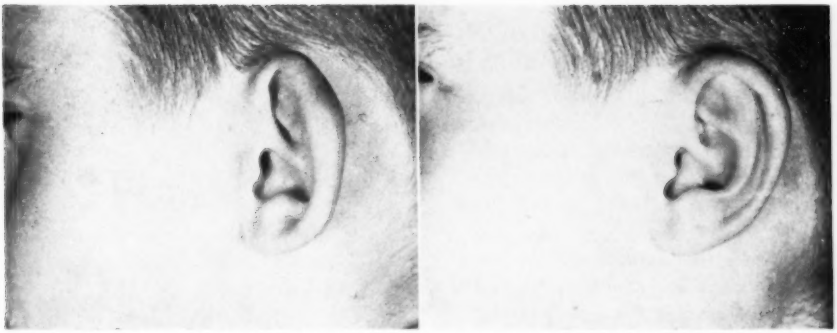

FIG. 3—Emphasis is placed on normal contour in the corrected ear as seen from the side without visible incisions on the convexity of the antihelix proper, across the area of the junction of the crura, or about the entire superior crus. (Left) Preoperative. (Right) Postoperative.

the posterior surface of the auricular cartilage. Care should be taken in initiating the removal of the wedge, but once the incision is started, it is readily continued the full length of the antihelix.

The apex of the knife tip is either pointed or slightly rounded. The pointed knife is utilized for removing narrow deep strips of cartilage. Care must be taken not to extend through the perichondrium on the anterior surface. The slightly rounded apex is less likely to extend through the cartilage, and should an incision be visible on the anterior surface, it is less pronounced when a rounded trough has been produced from the posterior surface. Once the surgeon is familiar with the use of the knife, no incision should be visible from the anterior surface over the convexity of the antihelix; this is one of the chief advantages of this method of otoplasty. The cartilage spring is broken, yet the normal thickness and resilience of the cartilage is preserved by the intervening strips of full thickness cartilage. In advocating this technique of otoplasty, it is not my intention to expect the surgeon to buy a special instrument, for this is not necessary; but those who have used this knife have been pleased with the results (fig. 3).

It is suggested that the knife may also be utilized to produce the desired angulation of the cartilage in nasal septal surgery or for the bending of small cartilage implants.

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NEW AUDIOMETER—HEARING AID: THE SOUND PRESSURE EQUALIZER

E. G. BARNET, M.D.
PHOENIX, ARIZONA

WITH the tremendous electronic improvements in audio sound systems, it was only natural that many of these ideas could be combined, refined and utilized in a unit that could be used as both an audiometer and a hearing aid. If one listens to a small radio of an older type and then to a modern instrument of quality, one is amazed at how the hum, the background noise and all sound distortion can be completely eliminated. These characteristics are combined in what is called the "Sound Pressure Equalizer."* The instrument is so constructed that the pressure on both drums can be equalized. The electrical input and the hearing loss can be measured on meters either separately or simultaneously.

PROCEDURE

The earphones are placed over the patient's ears. The microphone is strapped around the doctor's neck, leaving both his hands free and also enabling him to move about. The switch is turned to *On* position, and the master volume control is turned to *Full*. The right side volume control is turned to obtain maximum volume and the meter knob is then turned so that the arrow points to the end of the dial. This calibrates the machine automatically eliminating the need to return it to the factory for recalibration, a necessity with all other audiometers. The same procedure is repeated for the left side.

Right and left volume controls are now turned to 0-4 on the dial, with right or left side switched off. The green area on the dial indicates *normal hearing*. If the patient does not hear the normal spoken voice at this level, the volume knob is turned up to 4-6 (yellow section on dial); this indicates mild hearing loss. If hearing is not satisfactory at this area on dial, volume is turned over 6, which is the red area on the dial; this indicates need for a hearing aid, lip reading, or both. It is remarkable how patients understand the amount of their loss on colored dials without a lot of questions and answers. Any dial reading can be recorded and quickly repeated at future visits. The instrument is not intended to replace higher-priced audiometers, when the decibel loss must be estimated to the closest possible measurement for compensation cases, etc., but it is a tremendous timesaver, usually saving all the time used on a regular audiometer test less one half minute.

This multipurpose hearing aid—audiometer is a new instrument. When used on any patient one can obtain the following information:

A. *Used as an Audiometer*

1. Voice reception can be classified as good, mild loss, or lip reading, or both. Even a preschool child can

Presented as a *New Instrument* at the Sixty-Fifth Annual Session of the American Academy of Ophthalmology and Otolaryngology, Oct. 9-14, 1960, Chicago.

*Sound Pressure Equalizer supplied by Better Living Products, Inc., 907 Professional Bldg., Phoenix 4, Arizona.

be screened in less than one minute.

2. Preference for a monaural or a binaural hearing aid in any given case.
3. Prediction of favorable or poor result before stapes surgery.
4. Hearing is frequently demonstrated in so-called dead or deaf ears; many times useful hearing is shown and utilized on this instrument.
5. Electrical input and decibel loss can be measured on either or both ears simultaneously on separate meters.

B. *Used as a Hearing Aid*

1. Because of the complete lack of voice distortion and hum even when turned on maximum volume, the physician can talk to the deafest patient without raising his voice, temper or blood pressure.
2. Extremely deaf patients who will not or cannot tolerate regular hearing aids at maximum volume because of recruitment, distortion or pressure on drums, can use this instrument as a desk-type hearing aid for either business, social or family conversation.

In Memoriam

Ruskin Gregory Anderson....Spartanburg, South Carolina
December 30, 1960

David I. Bassett.....New York, New York
September 24, 1960

Macks Leonard Bergman.....Los Angeles, California
December 18, 1960

William F. Bonner.....New Orleans, Louisiana
December 27, 1960

John C. Brown.....Los Gatos, California
November 27, 1960

Delos Wylie Hogue.....Rye, New York
September 2, 1960

Chevalier Lawrence Jackson.....Philadelphia, Pennsylvania
January 13, 1961

George F. J. Kelly.....Merion, Pennsylvania
October 6, 1960

Maurice C. Landau.....Glens Falls, New York
September 14, 1960

Bernard J. Larkin.....Indianapolis, Indiana
October 5, 1960

In Memoriam

David Taylor Loy.....Great Bend, Kansas
November 5, 1960

Ben F. Mowry.....Findlay, Ohio
October 28, 1960

Gerald Richard O'Brien.....Brooklyn, New York
November 29, 1960

Gerald Ogden Poole.....Wilmington, Delaware
September 24, 1960

Henry Edward Schlegel.....Oregon City, Oregon
October 16, 1960

Harry Raymond Secoy.....Everett, Washington
December 13, 1960

Maurice Arthur Sher.....Brooklyn, New York
September 14, 1960

William Jewell Smith.....Fresno, California
September 12, 1960

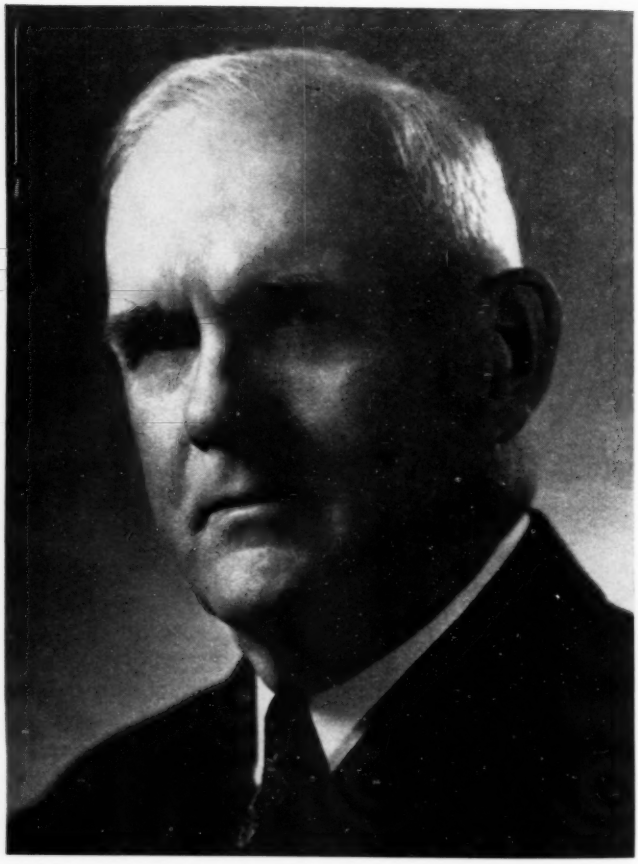
Lansford Monroe Spalding.....Astoria, Oregon
August 27, 1960

Edward Stein.....Oak Park, Michigan
July 18, 1960

Edward Henry Thompson.....Cincinnati, Ohio
October 17, 1960

Paul Robert Urmston.....Bay City, Michigan
August 24, 1960

In Memoriam



CARL HEBER McCASKEY

1877-1960

CARL HEBER McCASKEY

1877 - 1960

Dr. Carl Heber McCaskey, of Indianapolis, died October 8, 1960. He was 83 years of age. Dr. McCaskey had retired from active practice in December of 1959, and he suffered a cerebral hemorrhage in April 1960.

Dr. McCaskey was born September 1, 1877, on a farm in Grant County, Indiana. He attended the Indiana Medical College and was graduated in 1908. This school later became associated with Indiana University and became the Indiana University School of Medicine.

Dr. McCaskey served an internship at the Deaconess Hospital in Indianapolis and began the general practice of medicine in 1910. He gave up his general practice in 1916 to take residency training in Otolaryngology at the New York Post Graduate Hospital for two and a half years. He returned to Indianapolis and became associated with Dr. Green Woolen in the specialty of ear, nose and throat. He served on the active staff at the Indianapolis City Hospital and was placed in charge of the otolaryngological service of that hospital. He also became associated with the Indiana University School of Medicine and was an associate professor of Otolaryngology until 1935, when he became chairman of the Department of Otolaryngology at the Indiana University Hospital. He served in this capacity for seventeen years, retiring from this position in 1952. During his tenure as head of this department, the department was greatly expanded and the Indiana University Post-Graduate Anatomical Course in Head and Neck, which had been initiated by Dr. John Barnhill, was further expanded under Dr. McCaskey's service.

Dr. McCaskey served as chairman of the Admissions Board of Indiana University School of Medicine. He served as President of the Indianapolis Medical Society in 1935, President of the Indiana State Medical Association in 1943, President of the American Academy of Ophthalmology and Otolaryngology in 1947, and Vice President of the American College of Surgeons. He was a contributing member of the committees of the American Medical Association and the Indianapolis and Indiana Academies of Ophthalmology and Otolaryngology. He also was

a member of the Examining Board of the American Board of Otolaryngology, the American Otological Society, the American College of Surgeons, World Medical Association, the Pan-Pacific Surgical Association, and the Academy International of Medicine. He established himself as a teacher and as a leader in his profession, both locally and nationally.

Dr. McCaskey was an ardent golfer and was a member of the Highland Golf and Country Club and the Columbia Club. He was also a Thirty-second Degree Mason.

Dr. McCaskey is survived by one daughter, a brother, and two grandchildren.

RALPH J. MCQUISTON, M.D.

TRANSACTIONS

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REGISTRIES OF PATHOLOGY

The Registry of Ophthalmic Pathology and the Registry of Otolaryngic Pathology at the Armed Forces Institute of Pathology are non-governmental agencies for the procurement and cataloging of pathologic material in the field of the special sense organs. The source of material is primarily the military hospitals and veterans hospitals. In the past two decades, since the registries were established, it has been possible for non-governmental hospitals and civilian practitioners to have distinguished pathologists review their case material and receive a diagnosis and a specimen section at no cost. This service has resulted in a vast accumulation of pathologic material studied, catalogued and preserved for research and training of pathologists in the more intricate phases of sensory disorders.

The registries of pathology at the AFIP are given support and are partially maintained by contributions from medical societies. The scope of activities conducted by and through the registries is limited by lack of funds to employ trained technicians, assistants, administrators and helpers. The potential of the Institute as a research center and training institution in pathology exceeds that of any other institution in the United States. While a number of ophthalmic pathologists have studied at the Institute on scholarships, the number that can be enrolled at one time is limited by the number of staff teachers, technicians and, until recently, space accommodations. Scholarships in otolaryngic pathology also are offered by the Academy but none have been assigned. Most of the students have spent periods of less than one year at the Institute. Some have produced studies for publication, usually in conjunction with a staff director. For several years the AFIP has provided sets of selected pathological slides for study by candidates for Board certification. Other sources of study slides cooperate with the Institute and make available other study sets, all of which are approved by the Boards.

While the Registries are non-governmental in the sense of financial support, they are administered through the National Research Council and operated by AFIP personnel staff. The Academy contributes to the support of the registries and also provides scholarships for extended study and training.

In his Jackson Memorial address at the annual meeting of the Academy, Dr. Lorenz E. Zimmerman, Chief of the Department of Ophthalmic Pathology at the AFIP, proposed expansion of the Registries by including living pathology, which would establish a center for case reports on persons who have diseases or disorders of the sensory organs, such as malignant lesions, congenital abnormalities, chronic metabolic and infectious disease and trauma, which will serve as source material for pathologic research. The Council approved the suggestion and directed further study of its feasibility by the committees on pathology. There is much in favor of expanding the services of the Registries at the AFIP. First there is the wealth of study material; a permanent situation that will not be seriously threatened by change of staff personnel; the centralization of study groups by affiliation with teaching institutions that maintain laboratories where, through interchange of specimens, reports, students and teachers, a nation-wide pathological service can be realized at minimum cost.

The Academy is cooperating with the National Institutes of Health in a number of research projects and is now exploring the opportunity to provide similar aid in a training program in the field of special senses. It is not necessarily limited to pathology, but so far no other category has been seriously considered. The opportunity for greater support of education in ophthalmology and otolaryngology is now at hand. The Academy is the logical American institution through which unity of support from governmental and non-governmental sources can be implemented to best utilize the educational resources of this nation in training teachers in the field of sensory diseases.

W. L. Benedict, M.D.

AWARDS FOR ORIGINAL INVESTIGATION IN OTOLARYNGOLOGY

Each year the American Academy of Ophthalmology and Otolaryngology offers awards for outstanding investigative work performed during residency training. These awards are an expression of the high value which the American Academy of Ophthalmology and Otolaryngology places on original effort as the basis of medical progress.

The main purpose of the awards is to give recognition for outstanding investigations performed by young physicians who have focused their attention on Otolaryngology. The Academy also hopes that the award program will provide an extra stimulus for those who have investigative ideas as well as a stimulus to department heads to provide time and facilities so that their students can pursue these ideas.

Separate awards will be given for clinical and for basic investigations in the broad field of Otolaryngology. The broad field of Otolaryngology includes the ear, nose, throat, nasopharynx, oral cavity, larynx, esophagus, tracheobronchial tree and neck. Clinical investigation is understood to mean any study involving human patients which contributes information regarding the symp-

tomatology, etiology, diagnosis, course, complications, therapy, etc., of any otolaryngological disorder. Basic investigation includes any study which involves histologic, physiologic, audiologic, experimental-surgical and other similar procedures or lines of investigation. Research may be both of the clinical and basic types, such as a study involving both humans and animals, and the Committee for Research in Otolaryngology will decide in which category such a manuscript is to be considered.

The competition is open to Doctors of Medicine who have completed at least one year of internship (not necessarily in the United States or Canada) and who began resident training in Otolaryngology no longer than five years past. Residency training must be in an approved American or Canadian hospital but the contestant need not be an American or Canadian citizen. The investigative work must have begun during the normal three or four year residency program but may be completed afterward. The majority of the investigative work must have been performed by the contestant, although he may acquire needed advice and technical assistance. The work need not be entirely original and may represent a continuation of research already in progress in a laboratory. The author's name should appear on the title page. Co-authors may be listed, but the contestant must be the first author. When an equal contribution to the investigation has been made by two or more qualified contestants, a letter should accompany the manuscript stating this fact. A cash award made for an entry having two or more qualified authors will be divided equally between these authors.

The Academy wishes to allow the contestant complete freedom in the publication of the manuscript. Thus, both published and unpublished papers will receive equal attention so long as they are submitted within the time limitation indicated. Reprints will be accepted, if submitted within one year of publication. Manuscripts must be typewritten and follow accepted style for journal publication. An accompanying letter should state whether the manuscript has been published or has been submitted for publication.

Judgments of merit will be based on scientific content as well as the manner of presentation. Manuscripts should contain a minimum of historical detail, review of the literature and statements of opinion.

The manuscripts must be in the hands of Dr. Juergen Tonndorf, University Hospitals, Iowa City, Iowa, not later than January 1, 1962, for awards to be presented in October 1962.

Awards will be made at the discretion of the Committee on Research and Finance of the Council of the American Academy of Ophthalmology and Otolaryngology and may be withheld if there are no manuscripts of merit. Cash awards shall not exceed six in number and shall not total more than $5000.00 in any one year. The award may be made for either clinical or basic research. Certificates of Merit may be awarded for exceptional manuscripts not winning cash awards. Letters in support of manuscripts will not be accepted by the Committee for Research in Otolaryngology.

G. O. Proud, M.D.
Chairman
Committee for Research in Otolaryngology
American Academy of Ophthalmology and Otolaryngology

LISTING OF AUDIOMETERS

The following audiometers are recommended for listing by a subcommittee of the Committee on Conservation of Hearing, American Academy of Ophthalmology and Otolaryngology:

PURE TONE AUDIOMETERS

Beltone Model 10-C Model 15-C	Beltone Hearing Aid Company Audiometer Division 2900 West 36th Street Chicago 32, Illinois
Maico Model MA-5 Model H1-B for pure tones only	Maico Electronics Inc. Maico Building 21 North Third Street Minneapolis 1, Minnesota
Sonotone Model 91	Sonotone Corporation Elmsford, New York
Zenith ZA 200	Zenith Radio Corporation 6501 West Grand Avenue Chicago 35, Illinois

SPEECH AUDIOMETERS

Grayson-Stadler Model 162	Grayson-Stadler Co. West Concord, Massachusetts

SCREENING AUDIOMETERS

Ambco Otometer 600	Ambco Inc. 1222 W. Washington Blvd. Los Angeles 7, California

Each model number in the list as a rule indicates the most advanced model of that series. If less advanced instruments are for sale under similar model numbers, it is assumed that they will function as well or better than the more complicated model in a series.

Acceptance for listing means that the audiometer manufacturer has demonstrated the ability to produce one instrument that performs according to A.S.A. specification. It does not imply that any individual instrument will perform within the tolerances. It is obviously beyond the scope of the Listing Committee or the Referee Laboratories to provide production control for audiometer manufacturers and their customers; however, listing does indicate that the product of the manufacturer can come up to 1951 A.S.A. specifications, and it is up to the customer to carry on negotiation with the manufacturer if a particular instrument which he receives is faulty.

Abatron D-100 and Ambco Oto-chek 800 were removed from the above list at the request of the respective manufacturers.

BOOK REVIEWS

LIGHT COAGULATION. By Gerd Meyer-Schwickerath, M.D. Translated by Stephen M. Drance, M.B., F.R.C.S. (Eng.). St. Louis, C. V. Mosby; 1960. Cloth; 111 pp.; 55 figures, including 7 in color.

Light coagulation as practiced by the author is rapidly catching on in larger eye clinics throughout the world; many American hospitals are equipped with the Zeiss coagulation, and a few with other models. Several American ophthalmologists have traveled to Germany for training by Meyer-Schwickerath and his staff and are now teaching American students.

Now the author has published in one small volume the fundamental facts about light coagulation of the retina and its application to external eye lesions, intraocular tumors and vascular proliferations. The instrumentation is briefly but adequately described and the technique of application is illustrated by diagrams.

The use of light coagulation is somewhat limited in treatment of retinal detachment, and the author explains its limitations as well as its extensive possibilities. Its most advantageous use is to seal the retina to the choroid in nearly normal eyes with macular holes. It serves as a preventive measure against detachment. In extensive retinal detachment its use is limited to an adjunct to surgery.

Several case reports are included to reveal the author's experience with light coagulation in several types of retinal diseases, particularly angiomas and other vascular disorders. Light coagulation for retinal lesions works best when applied over areas backed by normal choroid. The volume is a useful guide for use of light coagulation therapy.

IMPORTANCE OF THE VITREOUS BODY IN RETINAL SURGERY WITH SPECIAL EMPHASIS ON REOPERATIONS. Edited by Charles L. Schepens, M.D., St. Louis, C. V. Mosby; 1960. Cloth; 222 pp.; 130 figures, including 4 in color, 3 plates in full color.

The second conference of the Retina Foundation held May 30 and 31, 1958, is here recorded in the form of original papers, exhibits and discussions by a number of distinguished ophthalmic surgeons from America and abroad. The presentation is divided into five parts, each opened with a prepared paper followed by free discussion directed by a moderator. The subjects include anatomy, physiology, pathology, clinical observations, ophthalmoscopy and biomicroscopy. Surgical methods of treating detachment of the retina are discussed.

The aim of the Second Conference of the Retina Foundation was to arrive at a better understanding of the problems involved when the prognosis for correction of retinal detachment is poor. The condition of the vitreous has much to do with retinal separation and the results of operations for reattachment, particularly those designed to reduce the volume of the intraocular media. The discussions included comments by a number of participants in the conference on the indications for and the relative value of such procedures as vitreous implants, bucklings, resections and diathermies. A comprehensive look at a serious problem, which is well documented, illustrated and presented in a lucid style.

NEWS AND ANNOUNCEMENTS

AMERICAN COLLEGE OF SURGEONS

At the Annual Meeting of the Fellows of the American College of Surgeons in San Francisco, October 13, 1960, Dr. Wendell L. Hughes of Hempstead, L. I., N. Y., was elected as a member of the Board of Governors to represent the American Academy of Ophthalmology and Otolaryngology for the period 1960 to 1963.

AMERICAN BOARD OF OTOLARYNGOLOGY

Dr. Dean M. Lierle, Secretary-Treasurer of the American Board of Otolaryngology, has announced that the Board will conduct only one examination in 1961. This will be October 2 to 5, 1961, in Chicago at the Palmer House.

THE TREACHER COLLINS PRIZE ESSAY

Under the above title, the Council of the Ophthalmological Society of the United Kingdom has instituted a prize of £100, awarded triennially, for the best essay submitted upon a subject selected by the Council. The prize shall be open to qualified medical practitioners of any nationality. The essay shall be written in English language and may be published in the Transactions of the Ophthalmological Society, if the Council so desires.

The subject for the next award of the prize is "Demyelination and the Eye." The closing date for sending essays for this award is December 31, 1962. Essays should be submitted to the Honorary Secretary, Ophthalmological Society of the United Kingdom, 47 Lincoln's Inn Fields, London, W. C. 2, from whom also any further particulars can be obtained. No name should be on any essay, but a distinguishing pseudonym or quotation, which should also be upon a sealed envelope containing the candidate's name and address, should accompany the essay.

TWO AWARDS FOR PAPERS ON OPHTHALMOLOGY AND OTOLARYNGOLOGY

The Pennsylvania Academy of Ophthalmology and Otolaryngology is offering a $100 government "E" bond to each of two medical students who write winning papers on the advantages and disadvantages of specialization in eye or ear work. One winner will be selected for the paper on ophthalmology, and the other for the paper on otolaryngology.

Only condition for entering the contest is that the student must be an undergraduate at one of the six Pennsylvania Medical Schools. There is no restriction on length of paper, nor is any commitment to specialize in these fields required of the student. If there is genuine interest in such specialization, the Pennsylvania Academy will be glad to advise the student further, if requested.

The winning papers will be selected by the Committee on Scientific Work of the Academy. Winners will be announced during the annual convention of the Academy in Bedford Springs, May 17 to 21, 1961.

Papers must be submitted by February 1, 1961 to Paul C. Craig, M.D., Chairman, Committee on Scientific Work, 232 N. Fifth Street, Reading, Pa.

THE GOULD AWARD

Dr. Janwillem van den Berg of the University of Groningen in The Netherlands, has been selected to be the recipient of the 1960 Gould Award by the International Gould Award Committee. The Award was presented to Dr. van den Berg in recognition of his contributions to laryngeal physiology.

The Gould Award includes an illuminated plaque and an honorarium of $350. It is presented annually for outstanding contributions to basic laryngeal research. The candidate is selected by an International Committee, which at present in-

cludes Professor Cotoji Satta, M.D., Tokyo; Professor Dr. Luzius Rüedi, Zurich; Professeur Georges Portmann, Bordeaux, and Dr. Hans von Leden, Chicago.

U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

Dr. Maitland Baldwin, Chief of the Surgical Neurology Branch of the National Institute of Neurological Diseases and Blindness since 1953, has been appointed clinical director of the Institute. He succeeds Dr. G. Milton Shy, who recently was appointed to the newly created position of associate director of the Institute.

Before coming to the Institute, Dr. Baldwin was assistant professor of neurological surgery at the University of Colorado. Previously, he was assistant neurosurgeon at the Montreal Neurological Institute, Montreal, Canada, and a member of the faculty of medicine at McGill University in that city. He received a Master of Science Degree and the Diploma in Neurological Surgery from McGill and his degree of Doctor of Medicine from Queen's University, Kingston, Ontario.

Doctor Baldwin is author and co-author of numerous articles and books on various phases of neurology. As NINDB's new clinical director, he will direct a program of investigation in a wide variety of neurological and sensory disorders.

SEVENTH INTERNATIONAL CONGRESS OF NEUROLOGY

The Seventh International Congress of Neurology will be held in Rome, September 10 to 15, 1961, under the auspices of the World Neurologic Federation and of the National Institute for Nervous Diseases and Blindness of Bethesda. For further information, please write Dr. James L. O'Leary, Washington University School of Medicine, 600 South Kingshighway, St. Louis 10.

FIFTH INTERNATIONAL CONGRESS OF ELECTROENCEPHALOGRAPHY AND CLINICAL NEUROPHYSIOLOGY

The Fifth International Congress of Electroencephalography and Clinical Neurophysiology will be held from September 7 to 13, 1961. For further information, please write to the Secretary General, Dr. Raffaello Vizioli, Viale Università 30, Rome, Italy.

AMERICAN SOCIETY OF OPHTHALMOLOGIC AND OTOLARYNGOLOGIC ALLERGY

The Annual Meeting of the American Society of Ophthalmologic and Otolaryngologic Allergy will be held Saturday, October 7, 1961, at the Sherman Hotel, Chicago. The morning program will consist of a workshop on the diagnosis and management of allergic disease. The afternoon program will consist of scientific presentations on allergy, immunity and medical otolaryngology.

AMERICAN SOCIETY OF FACIAL PLASTIC SURGERY

The American Society of Facial Plastic Surgery will hold the following meetings in 1961:

February 9 and 10, 1961, at Hotel Peabody, Memphis, Tennessee

June 28, 1961, at Hotel Elysee, New York.

For further information please write Samuel M. Bloom, M.D., Secretary, 123 East 83rd Street, New York 28.

PENNSYLVANIA ACADEMY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY

The next Annual Meeting of the Pennsylvania Academy of Ophthalmology and Otolaryngology will be held May 18 to 20, 1961, at the Bedford Springs Hotel, Bedford, Pa.

DALLAS SOUTHERN CLINICAL SOCIETY

The Dallas Southern Clinical Society will meet in Dallas, March 20 to 22, 1961. Among the guest speakers will be Ramon Castroviejo, M.D.; French K. Hansel, M.D.; Philip Knapp, M.D., and John J. Shea, Jr., M.D. For further information, please write to Dallas Southern Clinical Society, Medical Arts Building, Dallas 1, Texas.

EYE AND EAR HOSPITAL, PITTSBURGH

The Twelfth Annual Scientific Day of the Eye and Ear Hospital of Pittsburgh will be presented on Wednesday, April 19, 1961, at the Eye and Ear Hospital, Pittsburgh. The morning program will consist of a workshop on rhinoplasty and nasal and sinus diseases. The afternoon program will consist of scientific presentations in ophthalmology and otolaryngology.

CHICAGO OPHTHALMOLOGICAL SOCIETY

The Chicago Ophthalmological Society announces the preliminary program of the Annual Clinical Conference to be held on May 19 and 20, 1961, at the Drake Hotel in Chicago.

The guest speakers will include Count H. Arruga, Barcelona, Spain; Mr. G. Leigh, London, England; Dr. Bernard Becker, St. Louis; Dr. Harold G. Scheie, Philadelphia, and Dr. Robert N. Shaffer, San Francisco.

The scientific program will include a symposium on Surgery and Medical Therapy of Narrow and Open Angle Glaucoma; a symposium on Secondary Glaucoma, and lectures on Retinal Detachment, Corneal Surgery and other subjects to be announced later.

Registration fee for the entire course, including round table luncheons and dinner is $45 and is payable to the Registrar, Mrs. Mary E. Ryan, 1150 North Lorel Ave., Chicago 51.

The Seventeenth Annual Sanford R. Gifford Memorial Lecture will be delivered by Dr. Harold G. Scheie of Philadelphia on Friday, May 19, 1961, at the Drake Hotel at 5:15 p.m. All physicians are invited to attend the Gifford Memorial Lecture and dinner which follows.

INSTITUTO BARRAQUER

The Third International Course of Ophthalmology of The Instituto Barraquer will be held in Barcelona, Spain, May 1 to 6, 1961.

The main subject of the scientific program will be "Surgery of the Anterior Segment." There will be sections on Surgery of the Crystalline Lens; Surgery of the Cornea, and Anterior Chamber Implant Surgery. Contributors to the program will be drawn from the European continent, the United Kingdom, and North and South America. In addition, the Institute will welcome films dealing with any ophthalmological subject.

Special travel arrangements are available. Dr. Richard C. Troutman of New York University is a member of the Executive Committee and will assist contributors from the United States.

SPRING POSTGRADUATE COURSES

The Institute of Ophthalmology of the Americas of the New York Eye and Ear Infirmary announces that the following postgraduate courses will be offered in the spring of 1961.

1. Ocular Surgery, including Lacrimal Sac Surgery, Glaucoma, Retinal Detachment, Cataracts, Enucleation and Evisceration, Keratectomies and Keratoplasties, and Anomalies of Extraocular Muscles including Ptosis and Orbitotomy. April 24 to 29, 1961. Limited to 20. Fee $225. Individual parts of the course may be taken at a prorated fee.

2. Histopathology of the Eye. Given under the direction of Drs. Bernard Roberts and Lawrence Samuels. May 1 to 6, 1961. Limited to 15. Fee $100.

3. Practical Aspects of Perimetry. Given under the direction of Dr. Mortimer Cholst. May 3 to 5, 1961. Limited to 15. Fee $40.

For registration, please apply to Mrs. Tamar Weber, Registrar, Institute of Ophthalmology of the Americas, New York Eye and Ear Infirmary, 218 Second Avenue, New York 3.

UNIVERSITY OF TORONTO

The Faculty of Medicine, University of Toronto, will hold a refresher course in Eye Surgery on March 20 to 22, 1961. The instruction will consist of lectures, operative sessions and a special symposium on cataract surgery. Dr. Robert N. Shaffer, University of California, San Francisco, and Mr. B. W. Rycroft, F.R.C.S., London, England, will be guest surgeons. The staff of the Department of Ophthalmology will contribute extensively.

The course will be limited to 50 members and is open to eye, ear, nose and throat specialists. Application should be made to the Director, Division of Postgraduate Medical Education, Faculty of Medicine, University of Toronto, Toronto 5, Canada, before January 31, 1961.

On March 18, there will be a Departmental Research meeting and Dr. H. M. Burian, University of Iowa, will be guest speaker. Members of the Eye Surgery Course are invited to attend.

BASIC COURSE IN OPHTHALMOLOGY

The Chicago Ophthalmological Society has announced the organization of a full-time residency-preparatory Basic Course in Ophthalmology. The course will be conducted once each year, and the first starting date will be July 10, 1961. The announcement was made by Dr. Joseph S. Haas, President of the Chicago Ophthalmological Society, who indicated that the course will be of five months' duration and that it has been designed primarily for physicians planning to specialize in Ophthalmology.

Cooperating with the Chicago Ophthalmological Society in the planning and presentation of the course are the Departments of Ophthalmology of Chicago's five undergraduate medical schools, several of the teaching hospitals and eye facilities, and the Cook County Graduate School of Medicine. Registration will be limited to thirty graduate students. The curriculum will include the basic sciences in relation to ophthalmology, the theory and use of ophthalmic instruments, and an introduction to clinical ophthalmology. For further information, please write to Registrar, Cook County Graduate School of Medicine, 707 South Wood Street, Chicago 12, Illinois.

MIDWESTERN SECTION ASSOCIATION FOR RESEARCH IN OPHTHALMOLOGY

The Midwestern Section of the Association for Research in Ophthalmology will meet in the Wahl Hall Auditorium of the University of Kansas Medical Center, Kansas City, Kansas, April 29 and 30 (Saturday and Sunday), 1961. The meeting will begin promptly at 9:00 a.m. on Saturday morning.

The deadline for submissions of titles of papers is March 15. They should be submitted to T. F. Schlaegel, Jr., M.D., Secretary, Midwestern Section, Association for Research in Ophthalmology, Indiana University Medical Center, 1100 West Michigan Street, Indianapolis 7, Indiana.

Accommodations for the meeting may be secured at the Student Union at the Kansas University Medical Center, Olathe and Rainbow Boulevard, Kansas City, Kansas; or the University Motel, 4125 Rainbow Boulevard, Kansas City, Kansas. The motels are less than one half block from the Medical Center.

Chairman of program and of local arrangements is L. L. Calkins, M.D., University of Kansas Medical Center, Rainbow Boulevard at 39th Street, Kansas City 12, Kansas.

1961 MEDALLIST OF THE ROYAL COLLEGE OF SURGEONS OF CANADA

Dr. John S. Speakman, F.R.C.S. (C), Department of Ophthalmology, University of Toronto, received the Annual Award in Surgery at the Thirtieth Annual Meeting of the Royal College of Physcians and Surgeons of Canada held at the Chateau Laurier, Ottawa, January 19-21, 1961. Doctor Speakman received the award for his essay on "The Structure of the Trabecular Meshwork and Corneal Endothelium in Relation to the Problem of Resistance to Outflow in Open Angle Glaucoma."

POSITIONS

Positions Available

Excellent opportunity for E. E. N. T. specialist to establish practice in Albuquerque, New Mexico. Office space available. Excellent equipment. Established practice. Physician recently deceased. For further information, please write Mrs. Albert L. Courville, 106 Girard Boulevard, S.E., Albuquerque, New Mexico.

WANTED—E.E.N.T. specialist for group practice in clinic associated with 65-bed fully accredited hospital in western Oklahoma. Must be Board qualified or certified. Starting salary, $15,000 to $16,000 plus additional attractive benefits; progressive pay scale. For further information write Donald D. Lehman, M.D., Medical Director, Community Hospital, Elk City, Oklahoma.

WANTED, OPHTHALMOLOGIST. Board certified or eligible ophthalmologist in Midwestern clinic. Located in Wabash river valley in a university town of 60,000 with a community population of over 100,000. For further information please write to E. L. Van Buskirk, M.D., The Arnett Clinic, 308-312 North Eighth Street, Lafayette, Indiana.

WANTED, OPHTHALMOLOGIST. Board eligible, to join busy 20-man clinic. Routine office and hospital ophthalmology. University town in a very prosperous educational and farming community. Near Chicago. Starting base salary of $15,000 with opportunity to join the association after eighteen months. For further information write to Edward C. Albers, M.D., Christie Clinic, Champaign, Illinois.

Positions Wanted

OTOLARYNGOLOGIST—Desires location for the practice of otolaryngology in a small or medium-sized town. For further information, please write Peter Lapsa, M.D., Baltimore Eye, Ear and Throat Hospital, 1214 Eutaw Place, Baltimore 17, Maryland.

Listings of positions available should be sent to W. L. Benedict, M.D., 15 Second Street S. W., Rochester, Minn., by the fifth of the month preceding publication. They should include (1) type of physician wanted (ophthalmologist or otolaryngologist: diplomate, resident, etc.) (2) type of position to be filled; and (3) to whom to write for further information. Unless otherwise requested, listings will be published only once.

The Academy will handle no further correspondence beyond the listing and assume no responsibility. Neither does it endorse nor guarantee any of the published listings.

OPHTHALMOLOGIST—Diplomate of the American Board of Ophthalmology and the National Board of Medical Examiners desires opportunity to practice in association with a single ophthalmologist or a group of ophthalmologists. Prefer location in the East. Licensed to practice medicine in New York and New Jersey. For further information, please write Edward V. Saradarian, M.D., EENT Clinic, Irwin U. S. Army Hospital, Fort Riley, Kansas.

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A PROPOSED CHANGE IN THE NORMAL HEARING REFERENCE LEVEL

The American Standards Association, the national otological societies, and other professional organizations agree with the International Standards Association that now is the time to have all audiograms recorded in the same way throughout the world, so that a given hearing level will mean the same thing to everyone.

A proposed international audiogram chart which will facilitate a change-over from the present American standard decibel scale to an international scale, together with an explanation of the mechanism for doing this, is printed as an addendum to

A GUIDE TO THE CARE OF ADULTS WITH HEARING LOSS

A Manual

Prepared for the Use of Graduates in Medicine by the Subcommittee on Hearing in Adults of the Conservation of Hearing Committee of the American Academy of Ophthalmology and Otolaryngology. New — 1960.

Price $1.00

AMERICAN ACADEMY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY
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DIAGNOSTIC PROCEDURES AND THERAPY IN UVEITIS

A collaborative study of the etiology of uveitis using a number of antigens for skin testing, also serology for toxoplasmosis, leptospirosis, and brucellosis has been established under the direction of the Academy. Antigens are prepared especially for this study and furnished free to ophthalmologists who participate. A wide cooperation is desirable. Patient reports on forms supplied by the Academy will be evaluated by the statistical division of the NINDB.

For a booklet of directions and an application form, write to

W. L. Benedict, M.D.
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The present treatment of chronic simple glaucoma is generally conceded to be a long-term "holding" operation—prevention of disease progression. Effective therapy is not just . . . "immediate control of elevated intra-ocular pressure", but also, assurance that control *will be routinely maintained* for a period of many years by the patient. To accomplish this aim PILOFRIN presents several important advantages—to physician and patient . . .

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